Gas Journal

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Editorial Notes

A Record Year

EXACTLY twelve months ago we expressed regret in these columns that early "news" of the Gas Industry's progress during the preceding year was not made available to the public through the medium of the newspapers or the wireless, as was the case with our chief competitor, records of whose activities were this time last year broadcast to the world at large. Our suggestion was that the Gas Industry should co-operate in the provision, in good time each year, of information calculated to be of general interest to the public as the electrical industry has done. We therefore welcome the publication last week of the gas consumption figures during the past twelve months, and the recognition of the need for such information, by means of which the Industry is not only able to show the public that it is holding its own in the face of all competitors and is making definite and appreciable progress, but that it is also taking its rightful place in the news of the day. For it cannot be denied that any figures indicative of progress—in whatever sphere—can, in the true sense of the word, be regarded as "news."

Although it was generally anticipated within the Industry that the year 1936 would establish a further record so far as gas sales were concerned, the official announcement in confirmation of this fact will have been greeted with universal satisfaction. According to the statement issued to the Press last week by the B.C.G.A., the amount of gas consumed in the British Isles during 1936 reached the new high figure of over 342,000 millions of cubic feet—representing an increase of 10,000 millions, or 3%, over the total of the previous year. And in the same period the number of consumers of gas advanced by no fewer than 247,741 to a total of 11,318,174. While a mere 3% may not seem, on the surface, to be an outstanding increase, in terms of actual output it represents no inconsiderable figure and reflects the results of much hard work and enterprise in all departments. Moreover, it is remarkable to contemplate that in so short a period as twelve months nearly a quarter of a million consumers —which actually means a very much larger number of persons—have for the first time been able to appreciate the inestimable benefits of up-to-date gas service. Most satisfactory perhaps of all to us in the Industry is the fact that these figures would appear to indicate a halt to the continuous decline in consumption per consumer which has been the cause of so much concern to us over a period of years.

The general improvement in industry, trade, and business during the year may be regarded as one of the primary reasons for this improvement; but progress has undoubtedly been accelerated by the fact that the Gas Industry has put itself in the position not only to meet this increasing demand, but, by continued research, by providing new apparatus to fulfil new or special requirements, and by making available scales of charges arranged on a more scientific basis than formerly, to meet more effectively the competition from other sources of light, heat, and power. And all these factors combine to give the Industry an even greater opportunity for still further achievements in the year upon which we are just setting out—a year which already gives many signs of considerable promise—particularly in the industrial field.

Non-Skid Roads

THERE has been issued jointly by the Department of Scientific and Industrial Research and the Ministry of Transport Road Research Technical Paper No. 1. This Paper is the first of a series devoted to studies in road friction and is an account of work which was commenced at the Road Research Laboratory at Harmondsworth in 1930 and is still being continued. It summarizes the results of a large number of measurements of the friction of tyres on roads of various types under many different climatic conditions and speeds, and includes the deductions and conclusions drawn from the measurements. The Paper is of first-rate importance to the Gas Industry in that it deals with the experimental sections of tar roads laid in various parts of the country in collaboration with the British Road Tar Association, the work of which organization has done so much to foster the use of tar on the roads. In 1930 eleven test sections were laid on the Kingston By-Pass, and of these two were of single-coat hot process tar macadam. These sections have stood up excellently for five years to conditions of fast and heavy traffic averaging as much as 12,000 tons a day. These sections were, from the point of view of non-

skid properties, safe when they were laid, and the safety factor has actually become greater with age. Throughout this period nothing has been spent on maintenance.

The results reported in the Road Research Technical Paper provide irrefutable evidence of the adequacy of tar as a material for the construction of safe roads, and they demonstrate, too, the very real value of the work of the British Road Tar Association, which has rightly laid such emphasis on the need for collaboration with highway authorities and the necessity for constant attention to what may be termed application technique. It is not just a question of providing tar to an approved specification; it is a matter of applying this tar in road making in such a way as to ensure its success under modern and changing conditions. We need to discover first exactly what properties we require in a road, and then systematically to ensure that the requirements are met, as they can be met, by British material. The Paper demonstrates that, as far as safety is concerned the use of British tar for British roads is amply justified, and it is unfortunate that this national aspect was not brought out in the references to the Paper which we have seen in the daily Press. What the Paper does not do is to discuss the question of cost. In this respect the cost of the tar-macadam stretches on the Kingston By-Pass compares most favourably with those sections of asphalt which gave similar results; and had the sections to be laid to-day the comparison would still further favour tar macadam.

There is no question that our Industry could play an important part in assisting the Minister of Transport in the new road plan. The extent to which this help will be sought, however, will depend on how the problem is approached by the tar industry. The British Road Tar Association has given us a glimpse of what can be accomplished by co-operative action, but the question may well be asked whether more could not be done in the way of organization. The question was in fact raised last June by Messrs. Cone and Chadder in their Paper at the Chemical Engineering Congress of the World Power Conference, referred to at the time in the "JOURNAL." The suggestion they put forward was the establishment of a national organization with control over the treatment and disposal of all the tar produced in the country. They envisaged a British Tar Products Federation, having at its head a Director responsible for the inauguration and supervision of research, investigation of new processes of tar treatment, choice of centres for tar distillation plants, supply of tar to the centres, development of improved methods of road construction "ideally suitable for an ideal road tar," and co-ordination of supply with demand.

We think there is a good deal in this suggestion. At the moment the tar industry cannot speak with a single voice, and it may well be that, if the industry is to take its proper place in the future scheme of things, its interests will need to be unified along the lines advocated by Messrs. Cone and Chadder. Such an organization would, as a result of research and experiment, be able to place before the Minister of Transport agreed recommendations for the treatment of the roads under his control, which recommendations would carry more weight than the present diversified views. As we have said before, the time is approaching when, instead of having to sell tar or tar products to county surveyors, the tar industry will be dealing with a central authority, and the business the industry will obtain will be for standard materials which have proved to be successful in use.

Sulphate and Gas Drying

THE latest Annual Report of the British Sulphate of Ammonia Federation, extracts from which were given in the "JOURNAL" last week, shows that the increase in fertilizer nitrogen consumption amounted to over 14% for 1935-36, compared with 8% in the previous year. Each class of fertilizer showed an increase, ammonium sulphate a matter of 11% over the 1934-35 figure. Ammonium sulphate retains its predominance as a fertilizer, the production during the year being 995,000 metric tons, 630,000 tons of this being synthetic ammonia; even so, synthetic nitrogen plants have on an average operated at less than half their capacity. A noteworthy feature is the rapid increase in the consumption of nitrogen for industrial purposes. This, of course, is influenced by quite different causes from those, such as the relative prosperity of the farming community, which affect the fertilizer nitrogen consumption. An unascertainable but large proportion of the consumption for industrial purposes is for explosives manufacture.

An interesting paragraph in the Federation's Report relates to the attention which has been paid during the year to problems connected with the artificial drying of grass. Two farms, one in Cheshire and one in Durham, have been taken over for the purpose of studying the technique of all operations connected with grass drying, and it is hoped that in time these will form useful demonstration centres. We have already referred in these columns to the possibilities of the use of coke for grass drying, and we gave a description in the "JOURNAL" for Sept. 2 of a coke-fired plant on a farm in Hertfordshire. In England and Wales we have some five million acres of grassland producing a little over a ton of hay per acre a year. If one-tenth of the product from this pasture land were artificially dried to produce a material of high feeding value for livestock it would necessitate the use of 300,000 tons of coke. That is how the London and Counties Coke Association look at the problem of grass drying. The British Sulphate of Ammonia Federation regard the matter from another angle, for this new development represents a new market for the use of nitrogenous fertilizers. The drying of grass artificially, then, concerns the Gas Industry directly in two markets—solid smokeless fuel and sulphate of ammonia. It is certainly a development to watch closely.

Training for Salesmanship

IT appears to be well recognized to-day that the Gas Industry needs salesmen of a calibre far different from those who sufficed for the requirements of a past generation. It is necessary that those who come into intimate contact with the Industry's customers, whether they be the smaller domestic consumers or the large industrialists, must have a solid backing of knowledge of the potentialities of gas and of coke, and, in addition to an understanding of the psychology of salesmanship, must have some technical background. The technical background will vary with the class of problem with which the official has to deal, but unquestionably the day of the amateur is over.

The Industry pays lip-service to these ideals, and to a certain extent endeavours to put them into practice. The knowledgeability of the lower grades of gas official has improved considerably during the present century. It seems, however, to have been left to the American coal industry to show us how the thing really should

be done. The American coal industry is in a different position from the British coal industry in that it is faced with competition with natural gas and with oil, both of which, being home-produced, cannot be restricted by tariffs as in this country. The collieries of America, therefore, have real competition to meet, in addition to the same scientific restriction on output as obtains here due to enhanced economy in the utilization of fuel. An annual series of short courses in Coal Utilization has been inaugurated by the University of Illinois for the avowed purpose of presenting an educational programme of technical and practical information pertaining to coal and its efficient utilization for the benefit of " those engaged in the mining, preparing, marketing, and using of coal and of those manufacturing and distributing machinery for the preparation and utilization of coal."

Coal interests from eighteen different States sent 215 of their employees to spend three days at the University to hear the second of these series of addresses and discussions, and the course has now been in increasingly successful operation for three years. In this country we rely upon experience gained during working hours, coupled with attendance at evening classes, which are only available in the larger towns and more populous districts. It would be worth considering whether the Gas Industry could not take a leaf out of the American coal industry's book and give to selected men from the grades below manager, under-manager, engineer, or chemist the opportunity to attend a similar course. It might be possible to arrange for a Northern course at Leeds and a Southern course in London. The stimulus that an eager student would receive from personal contact with the leaders of the Industry at a University should have an effect far beyond the technical knowledge gained, and might well lead to a striking access of enthusiasm in all ranks.

An American Course

The Amerian course consisted of short talks given by acknowledged experts in their subjects, professors, academic men, commercial men, and engineers all collaborating. Some of the titles will suffice to show the scope of the subjects discussed. " Coal analyses and their interpretation," " Boiler test calculations," " Dustless treatment," " Heat loss calculations for space heating," " ' Trouble shooting ' in the domestic field," " Packaged fuel," " Ash and its fusibility," " Essentials of air-conditioning," " Fuel advertising and sales promotion; " these are but a selection from the 21 Papers presented to the second course and which have recently been republished in a University of Illinois Bulletin, Vol. XXXIV., No. 18.

Perusal of the Papers shows that they present in simple language the essential elementary facts of the subjects discussed, that they give as much attention to sales problems as to technical problems, and that they include a lucid account of new ideas, new technique, and new appliances that have assisted or are expected to assist the sale of coal. We are apt to smile at American sales methods and to consider them as unsuitable for this country, but in the face of the intense competition that the Gas Industry is facing and must face in the future, it is well to ask ourselves whether there is not in them something that can be modified to suit our own special needs. We quote a few sentences from the conclusion of the talk on " Fuel advertising and sales promotion." " Many dealers sell their advertising plans to their employees and instruct them how to use them in their work—whether that may be in the field calling on customers or in the office. . . . Very interesting days are ahead of us. We are sure to see rapid and striking changes in the methods of selling our product, due both to the improvements in the equipment and the preparation of coal and to public demand for greater convenience, ease, and simplicity in obtaining comfortable heat. . . . To keep on week after week and month after month requires enthusiasm and persistence; and it demands our most earnest thought to get the most out of it." With trifling alterations those words apply equally to the British Gas Industry.

King George V. Memorial Fund

Widespread publicity has already been given in the National Press and elsewhere to the " Odd Shillings and Pence " appeal which is being launched by the Lord Mayor of London on behalf of the King George V. Memorial Fund.

There is little need to enlarge here upon the merits of a cause which must be very near the hearts of all the peoples of this Country and Empire, perpetuating as it will in a permanent and valuable way the memory of a beloved sovereign whose passing was felt with a deep sense of personal loss by each one of us. Briefly, however, it may be stated that the appeal takes the following shape. First, advertisements—for which space is being given free—will appear throughout the National Press containing the phrase " Tell Your Banker;" subsequent announcements will advise the public what it is they have to tell their Bankers—namely, to transfer to the Memorial Fund the odd shillings and pence in their accounts on the night of Jan. 20—the anniversary of King George's death. During the Memorial Week it is hoped that the public will give expression to their grateful recollections of King George's reign by signing the special transfer form which will be published in the National and provincial newspapers. The Alexandra Rose Day organization and similar bodies will also distribute forms from house to house, and in all it is calculated that some 150 million forms will be printed.

As is well known, the money raised by this novel method will be devoted entirely to providing playing fields in towns and villages throughout the land. The fact that the thoughts of those of us who live in towns turn immediately to children living under slum conditions and in crowded streets when we think of the need for playing fields must not obscure our appreciation of the circumstances in the countryside. Not one village in ten in Great Britain has its own playing field, and in the light of present building developments this position cannot but lead to great difficulties and hardships for future generations. Unless countryside fields are preserved now for open spaces, it may be impossible to provide in those areas better playgrounds than now exist in our towns.

The Gas Industry has cause, in common with almost every other industry, to be profoundly grateful to King George V., and to other members of the Royal Family, for the sympathetic interest displayed on many occasions during that momentous reign in various phases of our activities; and we feel sure that the Industry throughout the land, for this if for no other reason, will readily respond to a cause of which we know our late King would have most heartily approved. By so doing we can acknowledge in some small way a life's work which evoked universal gratitude.

CORRESPONDENCE

Marketing of Coke

SIR,—Publicity has recently been given to the Coke Associations that have lately been formed, having for their main object the stabilization of prices and at the same time the promotion of sales by improving the quality of the commodity.

The North-East Coast Coke Producers' Association was formed nine months ago and comprises the whole of the coke producing gas undertakings and all the coke oven producers in North Yorkshire, Durham, and Northumberland; it deals with an area extending from Alnwick in the North to Whitby in the South. It is divided into two sections—Northern and Southern—four members of each being elected as representatives on the Committee for either section.

Since its inception many difficulties have arisen which have been overcome by a spirit of compromise which has always prevailed. Great care has been taken not to take undue advantage of the present boom conditions, but rather to place contracts at reasonable prices which we hope will be maintained. We are, of course, much indebted to the lead given by the London and Counties Coke Scheme, but certain conditions they have adopted are not feasible on the North-East Coast where the coke oven producers market the greater portion of their output, whereas in the South the hard coke is sold mainly by merchants.

The members of the North-East Coast Coke Producers' Association work most harmoniously together, and we in the Gas Industry feel that it is a great achievement to have the full support of the coke oven producers. There is a movement on foot to organize a similar scheme in West and South Yorkshire. Up to the present it would appear that several coke oven producers are disinclined to join up. To these producers I would say that it is to their distinct advantage to become members of an Association, as it prevents price cutting which at the best is a suicidal policy. If the hard coke producers will only realize that gas undertakings can only produce gas coke according to the demand for gas, and that this coke must be sold, they will appreciate there is no object in cutting prices to effect its sale. After the gas coke produced has been sold, the hard coke producers have a free hand to dispose of their output, which is generally arranged so that minimum railway carriage rates are incurred.

The scheme set out above is now being countenanced by the Coal Mines Department in the new Central Selling Scheme, with the exception that gas undertakings have not a free hand as to the collieries from which they may obtain their coal requirements. It would appear, therefore, that if the gas undertakings throughout the country are desirous of obtaining the best financial return from their residuals it is imperative that the various districts combine in a similar manner to the North-East Coast. The colliery companies as owners of the majority of the coke oven plants will, I feel sure, be only too pleased to collaborate, as the result will be of mutual benefit. Gas undertakings can and must sell the gas they produce at the lowest figure possible (having due regard to efficient works' maintenance and service to consumers) if they are to withstand electrical competition which is so unfairly supported by the Treasury. The Gas Industry must use all the resources possible to circumvent such malpractices, and selling coke in the best markets is one way of carrying this into effect.

I have no hesitation, therefore, in strongly recommending all gas undertakings who have not already done so to organize a coke selling scheme in their district with the ultimate object of a National Association being formed.

Yours, &c.,
STOCKTON CORPORATION GAS DEPARTMENT,
WILLIAM W. ATLEY,
Engineer and General Manager.

Corporation Gas-Works,
Stockton-on-Tees,
Jan. 8, 1937.

Forthcoming Engagements

Jan.

14.—I.G.E.—Public Lighting Sub-Committee, 2.30 p.m.
14.—MIDLAND JUNIORS.—Paper by G. E. Stevenson, of Long Eaton, "Obtaining the Goodwill of the Consumer."
15.—I.G.E.—Joint Committee on Complete Gasification under Pressure (16, Old Queen Street, S.W. 1), 3 p.m.
16.—YORKSHIRE JUNIORS.—Meeting at Sheffield. Paper by A. E. Wilson, "My Last Twelve Months with Industrial Gas."
18.—WOMEN'S GAS COUNCIL.—Inaugural Meeting of the London and Home Counties Demonstrators' Circle, 7.30 p.m.
19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
20.—B.C.G.A.—District Meeting at Cardiff.
21.—B.C.G.A.—District Meeting at Birmingham.
21.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Unaccounted-for Gas."
21.—S.B.G.I.—Council Meeting, 2.30 p.m.
22.—B.C.G.A.—Annual Meeting of Yorkshire District Members at Leeds.
22.—LONDON AND SOUTHERN JUNIORS.—Paper by T. J. Legge and T. G. Noble, "Baffler Performance in Relation to the Safety of Gas Appliances."
23.—MIDLAND JUNIORS.—Visit to Walsall Gas-Works.
23.—SCOTTISH WESTERN JUNIORS.—Visit to Port Glasgow Gas-Works.
23.—WESTERN JUNIORS.—Visit to Works of Swindon United Gas Company. Paper by D. A. Vince, of Swindon.
23.—WALES AND MON. JUNIORS.—Meeting at Neath. Paper by D. Rees, of Neath, "Reconstruction of an 1877 Gasholder."
27.—B.C.G.A.—Annual Meeting of Members in Scotland, Edinburgh.
28.—B.C.G.A.—District Meeting at Newcastle-upon-Tyne.
29.—B.C.G.A.—District Meeting at Exeter.
29.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

Feb.

3.—MANCHESTER AND DISTRICT JUNIORS.—Visit to West's Gas Improvement Co., Ltd.; Paper by J. Holland, "Works Reconstruction with Economies."
3.—LONDON AND SOUTHERN JUNIORS.—Visit to Davis Gas Stove Company, Ltd., and Electrolux, Ltd., Luton.
4.—MIDLAND JUNIORS.—Paper by W. N. Smirles, "Gas-Heated Hot Water Systems."
5.—MANCHESTER ASSOCIATION.—Visit to Works of Walpamur, Darwen; Paper on "Painting and Maintenance of Structural Work."
6.—SCOTTISH WESTERN JUNIORS.—Annual Whist Drive and Dance.
6.—SCOTTISH EASTERN JUNIORS.—Visit to Dundee Gas-Works; Paper by D. Warden.
12.—LONDON AND SOUTHERN JUNIORS.—Paper by F. O. Hawes, "The Effects of Changes in Composition upon the Combustion of Town Gas."
13.—SCOTTISH WESTERN JUNIORS.—Debate Meeting.
17.—B.C.G.A.—Meeting of Executive Committee, 11.30 a.m.
18.—JUNIOR ASSOCIATIONS.—Visit to B.I.F., Birmingham.
20.—WESTERN JUNIORS.—Meeting at Bath; Paper by F. G. Craxford, "The History and Development of Gas Fitting."
23-25.—B.G.F.—Joint Gas Conference at the B.I.F., Birmingham.
26.—I.G.E.—Gasholder Committee, 2.30 p.m.

1937 GAS SALESMAN'S POCKET BOOK

A FEW COPIES ONLY REMAIN OUT OF A RECORD PRINTING NUMBER. Actually, as we go to press with this week's "JOURNAL," the "remnants" are something under 500 copies; and we already know of several heavy calls still to come. We have found it unnecessary to send out a general follow-up, and the object of this notice is to remind the few regular buyers of the Pocket Book who have not yet ordered.

Personal

Mr. W. R. Drummond.

Reference was made in last week's "JOURNAL" to the appointment by a Joint Committee of representatives of the National Bodies of a resident officer in Scotland. Mr. W. R. Drummond, M.A., B.Sc., has taken up his duties at a temporary office at 242, West George Street, Glasgow, where he will undertake all secretarial duties appertaining to the National Bodies in Scotland.

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Staff Changes at Watford.

The following appointments of Chief Officials of the Watford and St. Albans Gas Company have been announced by the Directors as from Jan. 1.

Mr. G. WILKS, who has been with the Undertaking for nearly forty years, having been Secretary and Commercial Manager for the past six, becomes General Manager and Secretary. Mr. Wilks has, since 1928, seen the successful introduction of the Pension Fund, Life Assurance Scheme, and Group Pension Schemes, in addition to the enlargement of the original Company by the acquisition of six neighbouring gas undertakings.

Mr. T. C. BATTERSBY, who joined the St. Albans Company in 1922 and at the time of the amalgamation was Assistant Engineer and Chemist, has been appointed Chief Engineer. He has been St. Albans Works Manager and Engineer since 1930 and was recently responsible for the erection of the "Westvertical" carbonizing system at those works; he is a Member of The Institution of Gas Engineers and a Fellow of the Chemical Society.

Mr. W. EVETTS succeeds Mr. T. S. Godwin (whose retirement is mentioned on this page) as Watford Works Engineer, at which works he has been Assistant since 1922.

Mr. H. C. DUNBAR, who has been at the Hemel Hempstead Works since 1913, has been appointed St. Albans Works Engineer.

Mr. B. H. ALMOND, who has had 36 years' experience with the Watford Company, has been appointed Accountant. He is a Fellow of the Institute of Company Accountants, and has witnessed the rapid progress in the centralization and mechanization of the Company's accounting systems.

Mr. E. T. WARREN, well known as Editor of the Company's *Co-Partner* since its inception, becomes Assistant Secretary. He is Chairman of the Company's Lawn Tennis Club and keenly interested in the educational activities of the employees. He was a qualified Secretary at the early age of twenty-four.

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We learn that Mr. EDMUND CROWTHER, Engineer and Manager of the Salford Gas Department, has been appointed Chief Engineer and Manager of the United Kingdom Gas Corporation, Ltd.

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Mr. G. D. COWIE, Engineer and Manager of the Ayton Gas Company, Berwickshire, for the past ten years, has received a similar appointment with the Crook (Co. Durham) Gas Company.

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Consequent upon the retirement of Mr. W. L. NICHOLSON, Assistant Gas Engineer, the Carlisle City Council Gas Committee has decided that Mr. J. G. AITKEN, at present Technical Assistant, be appointed Deputy Gas Engineer and Manager. Mr. H. A. G. COCKBAIN, Works Chemist, is to be appointed Technical Assistant.

On reaching the age limit at the end of December, Mr. T. S. GODWIN, Works Manager at the Watford Station of the Watford and St. Albans Gas Company, retired on pension after 47 years' service. Mr. Godwin had been in charge of the Watford Works since 1908.

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Alderman F. T. BRANT, Vice-Chairman of the Newcastle-under-Lyme Gas Committee, has been appointed Chairman to succeed the late Chairman, Alderman R. Beresford.

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Mr. FRANK W. GROUNDS, who for the past five years has been Chief Works Chemist at the Warrington Corporation Gas-Works, has been appointed Technical Assistant to the Chorley Borough Gas Engineer.

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We are advised that Mr. L. W. TOWNLEY has severed his connection with Flavels, of Leamington, and is now representing the Underpressure Engineering Company, Ltd., of Victoria Street, S.W. 1.

Obituary

The death occurred on Dec. 27 of Mr. WILLIAM HASTINGS BEAUMONT, who had been a Director of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., and of Woodall-Duckham (1920), Ltd., since March, 1935. Mr. Beaumont was Senior Partner in the firm of Beaumont & Son, Solicitors, and was on the Board of the Westminster Fire Office.

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We regret to announce the death of Mr. DANIEL HALL, Senior Partner of Messrs. T. S. Hall, Southville Works, Southville, Bristol, who passed away on Jan. 7 after a short illness. He was the only surviving son of Mr. Thomas Spurrier Hall, the Founder of the business over half a century ago. The business will be carried on as usual by the remaining Partner, Mr. C. L. Hall.

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Just as we go to press we learn of the sudden death at Colwyn Bay last Saturday morning of Mr. ALBERT PRIESTLEY, Senior Partner of the Standard Furnace Company, of Southport.

Palestine Gas-Works Concession

Reported Award to British Firm

It is reported from Tel-Aviv, Palestine, that at a meeting of the Municipal Council on Dec. 28 the gas-works concession for the City of Tel-Aviv (which now has a population of over 150,000 persons) has been awarded to the firm of Close Bros. There were ten other applicants.

The details of the concession, which will probably be for fifty years, are being discussed with the local representatives of the firm, Mr. A. Effrus, Mr. Kelly, and Dr. Dralicz, and work will begin on the erection of the plant as soon as the contract is signed. It is expected to take about a year, and will mean the employment of over 1,000 men, excluding the office staff.

The 150 kilometre main which will be laid through the city will be used for cooking and heating purposes only in the 7,000 houses of Tel-Aviv.

The firm is allocating £300,000 towards the cost of erecting the plant, while another £200,000 has been earmarked for gas fittings and appliances in the houses.

Water Pollution Research

Summary of Current Literature*

The January issue of the summary of current literature on water pollution research which is published by the Department of Scientific and Industrial Research includes an abstract of the 6th Report of the Liquor Effluents and Ammonia Committee of The Institution of Gas Engineers.

The publication contains 114 abstracts which have been prepared by the Water Pollution Research staff of the Dept. S. & I.R. These abstracts are divided into the following sections: Water supplies, analysis and examination of water, sewage, trade waste waters, pollution of natural waters, and miscellaneous. This division greatly facilitates reference.

The abstracts are published monthly, and Author and subject indexes are included in December each year.

* London: H.M. Stationery Office. Price 2s. net (annual subscription 24s. net, post free) from H.M.S.O., or their agents, but *not* from the offices of the Dept. S. & I.R.

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

The Quarterly Index for the October-December Volume (No. 216) of the "JOURNAL" is included as a supplement to this issue.

The Price of Gas at Elie, Fifeshire, is to be reduced by 5d. per 1,000 cu.ft. This was intimated at a meeting of the Town Council, and the reduction will take effect from March 1.

Gas Chambers and Coke Ovens, Ltd., have received advice that their tender for C.O.L. intermittent vertical chamber plant for Petone (near Wellington), New Zealand, has been accepted by the Gas Board of that town subject to approval of the Loans Board.

With a View to Improvements on their own Works, members of the Hebden Bridge and Mytholmroyd Gas Board have lately paid visits to the Works of the Yeadon and Guiseley Gas Company and the Otley Gas Company to inspect up-to-date plant of various kinds.

The Proposed Coke Oven Gas Supply to the Newcastle-under-Lyme Borough Council from the Shelton Iron, Steel, and Coal Company, Ltd., who already supply the Stoke-on-Trent City Corporation, has had to be abandoned. The Town Clerk has informed the Council that the Company have stated that they have no supply available.

Remarkable Records were established at a meeting of the Manchester Justices Gas Meter Testing Committee held on Jan. 11. Mr. H. N. Barrow and Mr. Harold King were elected Chairman and Deputy-Chairman, respectively, for the seventeenth successive year, and Mr. W. H. Hesketh and Mr. Hans Renold were elected to the Committee for the nineteenth successive year.

After Considering a Report by the Town Clerk on the position affecting the minerals under the Oswald Street Gas-Works, the Burnley Gas Committee recommend that, provided the consent of the Minister of Health is obtained to the borrowing of the money, the Council should agree to the payment of £11,017 to cover the cost of compensation for coal left unworked in the lower Mountain and Dandy Mines required to support the gas-works.

The Suggested Joint Gas and Electricity Committee has been rejected by the Kendal Town Council, who have decided that no useful purpose would be served by the amalgamation either wholly or partially of the two departments. The special committee appointed to go into the matter reported to the Council at a recent meeting that such an amalgamation would neither effect any material saving nor prove beneficial to the consumers.

Owing to the Steadily Increasing Consumption of gas in Stoke-on-Trent the City Gas Engineer, Mr. A. Mackay, has pointed out to the Gas Committee the necessity for immediate extension of the plant in order to meet future requirements. As a result it has been decided to erect a new boiler house at a cost of £6,500, to be met out of revenue, and to apply to the Ministry of Health for sanction to borrow the sum of £38,050 for additional plant as follows: Three new boilers, pumps, &c., £6,200; compressors, £12,550; and mains for high-pressure system, £19,300. Steel mains are to be substituted for the old cast-iron mains in Queen Street, Burslem, at a cost of £1,284.

Bottled Gas Supplies to rural households remote from the usual supplies of gas and electricity were discussed by Mr. Walter Moore, of the Agricultural Department of Marischal College, in an Address to the Aberdeen Business and Professional Club on Jan. 7. Mr. Moore explained that the reason for the interest of the North of Scotland College of Agriculture in the gas was that the college sought to bring to the notice of the agricultural community the most recent advances in science bearing upon rural life. There were thousands of houses in the North of Scotland outside the economic reach of gas mains or electrical distribution. Mr. Moore emphasized that the gas was complementary to and not a competitor of town gas. On a purely heat basis it could compete with electricity, and besides heating it could be used for lighting. The small initial cost, the absence of mechanical failure, and the almost foolproof nature of the equipment gave it decided advantages over small electrical generating sets on farms.

Hospitals, Telephone Exchanges, and Householders had to use candles for illumination when the electric lighting system failed in a large area of Lanarkshire on Jan. 4. The "black-out" affected Mount Vernon, Carmyle, Lenzie, Stepps, and certain Glasgow districts. At Robroyston Hospital, where there are about 500 patients, attendants were sent round with a supply of candles.

In His Customary Review of local affairs during the past year to the Haworth (Yorkshire) Urban District, the Chairman (Mr. T. Duerden) said again during the past year they had been able to give one of the cheapest gas services in the West Riding. Although increasing coal costs might make it difficult to maintain the existing price for gas, the same difficulty applied to other undertakings, so Haworth hoped to continue to offer one of the cheapest gas supplies as hitherto. Probably this year, he added, definite steps would be taken to provide a new gasholder and perhaps consideration of the future date of removal of the Gas-Works from the centre of the town.

A Large Gas Stove Lorry belonging to R. & A. Main, Ltd., was the principal performer in an unusual accident—though fortunately accompanied by no serious results (except to a front garden)—which occurred last week. The lorry, while being driven quietly along Bromley Common, suddenly and for no apparent reason plunged across the footpath through the wall and fence of a garden, and came to rest with its radiator against the wall of a house, a window in which was broken. But the really remarkable coincidence in the episode was that the lorry had left the firm's headquarters at Edmonton that morning *en route* for the Sussex coast, and the house which had such a peculiarly magnetic influence upon the vehicle is named "*Edmonton!*"

A Series of Cookery Demonstrations were organized by the East Grinstead Gas and Water Company in conjunction with the Cannon Iron Foundries, Ltd., the main feature of which was the Company's offer to white-ice consumers' Christmas cakes free of charge during the week from Dec. 14 to 19. Miss E. Eccles, C.D.S., was the demonstrator, and one showroom window was left open in order that passers-by could see the cakes being iced, the other window being utilized to exhibit the finished cakes. Over ¾ cwt. of the best icing sugar was used, and over 60 cakes were daintily decorated by Miss Eccles, no two cakes being iced alike. Such was the success of the scheme that arrangements were made for Miss Eccles to continue for an extra three days.

Mr. J. Corrigan, Engineer and Manager to the Brighouse Corporation Gas Department, lectured on Jan. 8 to the Brighouse Engineering Society on the subject of "Gas—Past, Present, and Future." Illustrating the lecture with lantern slides, Mr. Corrigan outlined the history of coal gas production and developments to the present wide ramifications of the Industry, and commented especially on the enormous increase in gas production during 1936 in spite of all forms of competition. In Brighouse itself gas output during the past five years had increased from 195 million cu.ft. to 244 million cu.ft. per year, and production was still growing. Figures such as these, he said, were the main reason for the supreme optimism of all connected with the Gas Industry.

Objections were Stated at the Kirkcaldy Dean of Guild Court on Jan. 7 by Mr. Michael Black, a Director of Messrs. Michael Nairn & Co., Ltd., linoleum manufacturers, against the proposed erection by Kirkcaldy Town Council of a gasholder on Corporation ground adjacent to property owned by his firm and exactly opposite new administrative offices which Messrs. Nairn were at present building. Mr. Black said that the new gasholder would stand 140 ft. high and would almost entirely shut out the light from their new offices. He suggested that an alternative site be found. For the Corporation, Mr. James Thomson said the site was Corporation ground and they had statutory powers to erect the gasholder on it. If they found an alternative site they would require to get the consent of all property owners within 300 yd. The Court adjourned the case for a fortnight.

Amalgamation and Grouping

Associated Gas and Water Undertakings, Ltd.

At an Extraordinary General Meeting of Associated Gas and Water Undertakings, Ltd., held on Jan. 1, 1937, Mr. W. L. Stenning, the Chairman, presiding, resolutions increasing the capital of the Company to £2,500,000 by the creation of 1,500,000 new shares of £1 each, of which 750,000 are to be ordinary shares and 750,000 irredeemable cumulative preference shares, were passed unanimously.

Gas Consolidation and Audley.

The Newcastle-under-Lyme Rural District Council has decided to dispose of the Audley Gas Undertaking to Gas Consolidation, Ltd.

Under the terms which have been agreed, the Company will be under a statutory obligation to maintain the supply in Audley, and the interests of the whole-time employees have been safeguarded. The Undertaking has been in operation for 59 years.

United Kingdom Gas Corporation, Ltd. Capital Increase.

A circular issued to shareholders states that the United Kingdom Gas Corporation has, during the past year, acquired control of various substantial gas undertakings in the North of England and elsewhere, and that these acquisitions have practically exhausted the available unissued share capital.

There is every prospect that further considerable acquisitions will be effected in the near future, and it therefore becomes necessary by increasing the capital to put the Corporation into a position to issue shares when required. Accordingly it is proposed to increase the capital by £1,000,000 to £4,000,000.

In order to comply with an existing investment demand, it is thought advisable to create £500,000 of the new capital in the form of 4% redeemable cumulative preference shares of £1 each. These shares, except as to redemption and rate of dividend, will rank in all respects with the existing 4½% cumulative preference shares.

It is further proposed to create 500,000 new preferred ordinary shares of £1 each, which will rank in all respects *pari passu* with the existing similar shares.

The opportunity is also being taken of changing the names by which the shares are known, so that they will be more readily classified on the market. It is proposed that the preference shares be known as first cumulative preference shares and first redeemable cumulative preference shares respectively, and the preferred ordinary shares as second non-cumulative preference shares.

None of these proposals in any way alters the rights of holders, except in so far as part of the new shares are to be issued as redeemable cumulative preference. As this may be considered in some respects a modification of rights separate general meetings of the three classes of shareholders are being convened to sanction the modifications.

The Directors consider that the results of the past years are satisfactory, and further immediate development on the lines contemplated will be advantageous alike to consumers and shareholders. They have therefore decided to convene the meetings for Feb. 1 at the Institute of Chartered Accountants, E.C. 2, and not to wait until the annual meeting.

University of Leeds

Department of Coal Gas and Fuel Industries

A special course of evening lectures will be given at the Department of Coal Gas and Fuel Industries (with Metallurgy) and Department of Mining during January, February, and March.

The lectures and speakers are as follows:

Preparation and Utilization of Coal.—Mr. J. Crossland, M.Sc., M.I.Min.E., and Mr. H. J. Hodsman, M.B.E., M.Sc., F.I.C.

Distribution and Utilization of Gas.—Mr. R. N. LeFevre, M.Inst.Gas E., A.I.Mech.E., Mr. C. A. Masterman, M.A., F.I.C., M.I.Mech.E., and Mr. W. Dieterichs, Assoc.M.Inst.Gas E.

By-Product Coke Processes.—Mr. G. J. Greenfield, M.Sc., A.R.C.S., A.M.I.Chem.E.

Recent Advances in Refractory Materials.—Mr. A. L. Roberts, Ph.D.

Engineering Metallurgy.—Mr. A. Preece, M.Sc.

The Laboratory will be open on Wednesday evenings during January and February for students who have already received some chemical training, but who desire instruction in Fuel Calorimetry and Pyrometry.

Further particulars may be had from The Registrar, The University, Leeds, 2.

Presentation to Sir Francis Goodenough

From Chief Officers and Staff of the B.C.G.A.

Presented to Sir Francis Goodenough, C.B.E., by the Chief Officers and Staff of the British Commercial Gas Association, on the occasion of his retirement on Dec. 31, 1936, from the Chairmanship of the Executive Committee, a position which he held for more than 25 years.

A silver salver with the above inscription was presented to Sir Francis Goodenough on Jan. 8 in the offices of the British Commercial Gas Association.

The presentation was made on behalf of the donors by Mr. W. D. Rowe, Manager of the Association, who said that the name of Sir Francis would always be associated with the Gas Industry. In fact, it was impossible to think of the Industry without remembering Sir Francis's work. Although the Association was losing Sir Francis, they would be saying not "good-bye," but "*au revoir*," for as Vice-Chairman of the South-Western Gas and Water Corporation his services would still be at the call of the Industry.

Sir Francis acknowledged the gift in a few well-chosen words and paid a tribute to the loyalty and enthusiasm of the staff during the whole of his years of office.

"Gas Journal" Shewring Fund

The total amount subscribed to the Fund was £983 18s. 4d. The books are now being audited, and we hope to be able to publish the auditors' report next week.

Public Order Act, 1936

Provisions Explained

The facility with which the Public Order Bill passed through Parliament may to a certain extent have misled many members of the public as to the scope and importance of this measure. We are indebted to Messrs. Jordan & Sons, Ltd., for a copy of a booklet entitled "Meetings, Uniforms, and Public Order," which, without defending or attacking the Act in any way, explains in an impartial manner how the new provisions will affect many people who are by no means political extremists.

The book is obtainable from all newsagents and booksellers for 6d., or from the publishers, 116, Chancery Lane, W.C. 2, for 8d., post free.

Safety First in Training of Apprentices

Value of Visual Demonstrations

In a lecture given on Monday last to the London Industrial Committee of the National Safety First Association, Mr. R. N. LeFevre, Officer in Charge of Training, Gas Light and Coke Company, explained what steps the Company take to teach apprentices safety-first principles. He expressed his belief in the value of visual demonstration in all forms of training, irrespective of the type of audience. With boys in particular, he said, more can be achieved by actual demonstration than by hours of lectures and note taking. In gasfitting practice there are a few very serious hazards which most uninitiated persons would not believe could happen unless they had actually witnessed them.

He attached considerable importance, therefore, to a series of carefully staged demonstrations of "accidents" which each apprentice must witness. For example, in order to bend steel or wrought iron tubing of sizes greater than ½ in. diameter it is necessary to heat the part to be bent in a forge. This part is frequently at, or near, the extreme end of a 10 or 12 ft. length of tubing. It is difficult to heat only the exact part required, so the fitter cools off the surplus by pouring cold water as required or by plunging the portion to be cooled into a tank or bucket of cold water. He also does this when he has bent the tube to expedite his further work with it. A somewhat surprising effect is produced. The red hot tube causes a rapid local boiling of the water and steam is forced up the tube and ejected with considerable violence from the other end. With a long length of tubing the nearby workmate is usually the victim.

The safety precaution is simple. One hand is placed flat on the free, cold end of the tube. The steam merely compresses the air in the tube and the man's hand is in contact with this air. A good demonstration of both right and wrong methods leaves little doubt as to which is the safe one.

Motor Bus Running on Coal Gas

Wallasey Experiment Extended

The Wallasey Town Council has sanctioned a further extension of the experiment of running a Corporation 'bus between Birkenhead and Wallasey on coal gas fuel.

Councillor F. W. Apperley said although they had a duty to the travelling public, they also had a national duty which they were trying to perform. In Germany at the present time there were 36 gas compressing concerns, and it was an order from the German Government that a great proportion of those 'buses used on national work must be run on coal gas. In the near future the Wallasey 'bus would have twelve cylinders containing gas, and those cylinders would weigh altogether about the same as two of the old ones, and stoppages *en route* for recharging would be very much reduced.

Councillor J. R. Williams said the present 'bus had to make 24 calls per day for the purpose of recharging. This occupied about 40 to 50 minutes in the whole day. With new cylinders the 'bus would only have to make eight calls, meaning about sixteen minutes.

Christmas Display at Lincoln

This showroom window display, featuring "Ascot" gas water heaters and gas-heated wash boilers, with appropriate slogans, was arranged by the City of Lincoln Gas Department during the Christmas season.

A Pictorial Survey

United Gas Industries' Fine Publication

Sixty-eight photographic plates depicting the various works and offices of the United Gas Industries' factories as well as a great number of smaller illustrations of appliances and productions and interesting reading matter combine to make this fascinating publication.

This brochure has been compiled to give a pictorial story of part of the resources, and a few of the products, of the Companies comprising United Gas Industries, Ltd., who have catered for the Gas Industry for many decades. "From Gasholder to Burner" would, perhaps, aptly describe the ramifications of the twelve factories of these Companies. These works, covering about twenty acres and situated in the principal industrial centres of the British Isles, are equipped with the latest modern plant, ensuring not only efficient manufacture, but also reliability for all their productions. Research work is for ever going forward, improvements being tested and incorporated. One outstanding result of the enterprise of these Companies during the past ten years is the production of the high-capacity and small high-capacity meters, the latter now officially approved by the Gas Industry through The Institution of Gas Engineers.

The Company make an untiring search for increased efficiency, accuracy, and simplicity to benefit both the Gas Industry and its ever-increasing consumers, who demand not only simple efficiency, but also improved design. The well-known companies constituting United Gas Industries, Ltd., are: Messrs. Willey & Co., Ltd. (founded 1865 and later embracing The Sutherland Meter Company and the Vulcan Stove Company), Smith Meters, Ltd. (1834), J. H. Robinson & Co. (Liverpool), Ltd. (1869).

At the present time the associated Companies have approximately 20 acres of plant and machinery, employ upwards of 3,000 hands, and use approximately 60 million cu.ft. of gas per annum, which is taken from twelve gas undertakings throughout the country, to supply the various works. This estimated annual consumption is utilized in gas meter production alone.

The publication is bound in stiff green covers embossed with gold.

Petrol from Coal

German Plant

The Essen Coal Mining Company and the Harpen Mining Company, of Dortmund, states the *Financial Times*, have founded a new chemical works at Essen with a capital of £1,000,000 for the production of synthetic petrol.

Town's Night of Darkness

Electricity Failure at Grays

Cinemas were closed, streets were in darkness, and shops carried on by candlelight at Grays, Essex, last Friday night as the result of an explosion in a sub-station of the County of London Electric Supply Company.

The explosion occurred at eight o'clock in the morning, destroying two transformers and causing considerable damage by fire. Throughout the day the district remained without electric power and heating. One factory had to close, others were operated by emergency power plants.

When darkness fell many houses were in complete darkness, and hundreds of dinners had to be cooked over open grates. Current was eventually restored shortly after 10 p.m.

The local telephone exchange, which is lighted by gas, was one of the few buildings unaffected.

Cheltenham "Sale"

Free Fixing

Two shillings in every pound can be saved by consumers of the Cheltenham and District Gas Company who take advantage of the Company's "sale" which opened on Monday, Jan. 4, and will run until Saturday, Jan. 23.

We have received from the Company a copy of their *Sale News*—an admirable production of generous proportions—which gives details and prices of every conceivable gas appliance, as well as many other items of interest to the consumer. The tone of the written matter is light-hearted and included is a humorous drawing which, for all its humour, is not lacking in sales persuasion.

Of particular significance is the question at the top of one column: "Are you a Shopkeeper?" The Shops Act, 1934, is then quoted, and the item concludes by pointing out that gas radiators will enable the shopkeeper to comply with the requirements of the Act with a minimum of trouble and expense.

Good Publicity for Industrial Gas

Sheffield Supplements

Once again we note with great pleasure the opportunism of the Sheffield Gas Company in securing for gas a well-merited position in those excellent annual industrial supplements published by the Sheffield *Daily Independent* and the *Sheffield Telegraph*.

As last year the front cover of each supplement is devoted to gas publicity. While this would only seem to be right in Sheffield, whose industrial prosperity is so largely dependent on its gas undertaking, it is all the more to the credit of the Company that they never relax their efforts to keep gas before industrialists. A bold note is struck on the front cover of the *Daily Independent* supplement, whose advertisement "Generate Cheap Electricity with Gas" has a rather uncommon theme in gas publicity, and certainly is carrying the fight to our competitors. This supplement also has an excellent article dealing with the ever widening scale on which modernism in industry seeks the aid of gas.

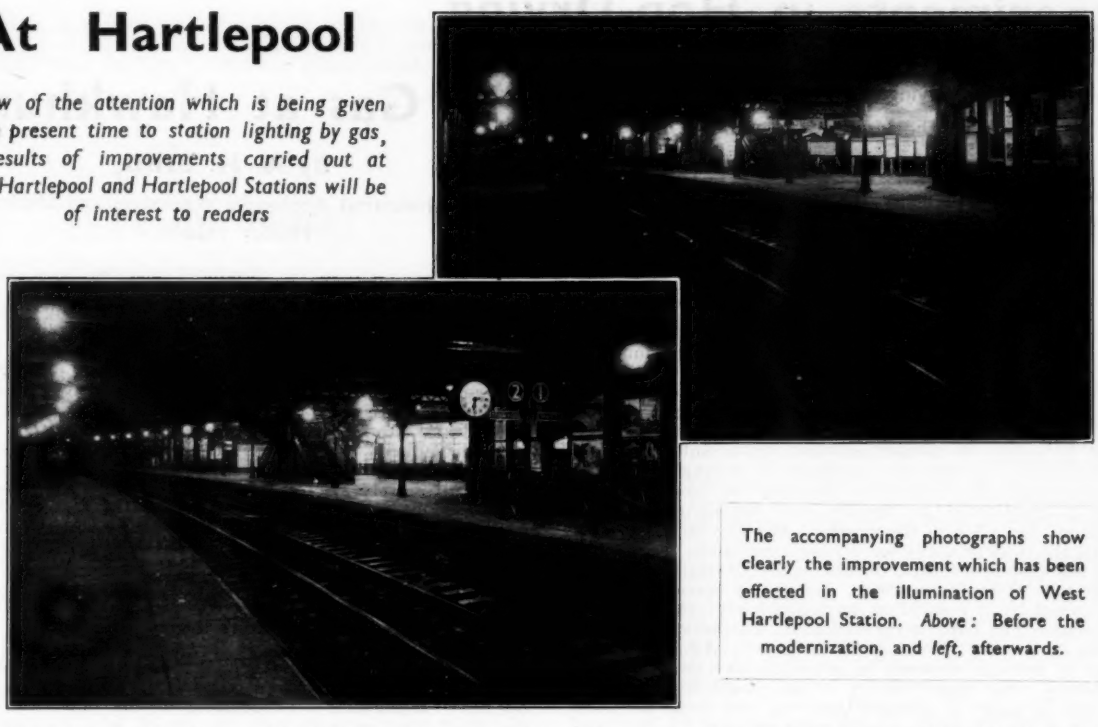
The cover of the *Sheffield Telegraph* has also a very strikingly coloured advertisement. In this instance a forging press is shown at work, and is linked with the part gas has to play in industrial operations. "Gas Never Fails to Give Greater Power, Bright Light, More Heat, and No Smoke." The included article deals with the use of gas in Sheffield's industries.

The Sheffield Gas Company and their General Manager, Mr. Ralph Halkett, have every reason to be proud of this fine achievement.

GAS IMPROVES RAILWAY STATION LIGHTING

At Hartlepool

In view of the attention which is being given at the present time to station lighting by gas, the results of improvements carried out at West Hartlepool and Hartlepool Stations will be of interest to readers



The accompanying photographs show clearly the improvement which has been effected in the illumination of West Hartlepool Station. *Above:* Before the modernization, and *left*, afterwards.

Early in 1936 the Hartlepool Gas and Water Company entered into negotiations with the London and North Eastern Railway Company with regard to improving the lighting of West Hartlepool Passenger Station, with the result that the Gas Company was entrusted with the work of completely renewing and improving the whole of the lighting arrangements at that station.

This necessitated—while maintaining the lighting—the dismantling of the old system, and the fixing of over 80 "Rochester" lamps on platforms, &c., and about 40 burners in rooms and offices, all the lamps being controlled by a series of distant control switches. The improvement in illumination is very marked, and has been favourably commented upon by the local railway staff as well as by travellers using the station.

No doubt as a result of the improvements at this Station, the Railway Company decided to carry out similar work at the Station in the neighbouring Borough of Hartlepool. This has now been completed, the number of lamps fixed being 35, in addition to 20 burners and fittings in offices.

The Coal Industry in the Third Quarter of 1936

Comment upon Mines Department Summary

The following comment upon the Mines Department's Statistical Summary for the September Quarter of 1936 is issued by Mr. Philip Gee on behalf of the Mining Association of Great Britain:

"The Statistical Summary for the coal mining industry for the quarter ended Sept. 30 is the third that has been published since the miners' wages were increased in January, and the first since the marketing schemes (except that for Lancashire and Cheshire) came into operation on Aug. 1. It should be noted, however, that these schemes were only in operation for two months during the period, and that they were still very largely in process of organization. In fact, the average proceeds from commercial disposals of coal only exceeded those for the June quarter by one halfpenny per ton.

"It will be seen that whereas in the March quarter the 'credit' was 1s. 5¾d. per ton, during the September quarter it was only slightly over 4¾d., or practically the same as during the June quarter. These 'credits' are not, of course, the same thing as profits, since they are arrived at before charging interest on debentures and bank loans and other items excluded from the Wages Ascertainment Returns from which the summaries are compiled.

"A comparison with the September quarter of 1935 shows an increase in the 'credit' of something over 4¾d. per ton as compared with a 'debit' of 1¾d.; an increase in the miner's average earnings per shift of 9d.; and an increase in the wages cost per ton of about 7½d.

"With regard to the 'voluntary' increases conceded at the beginning of 1936 by large consumers having running contracts, the latest figures (which for most districts relate to the period January to September) show that the total amount received by the colliery owners was £1,712,662, and that during the same period there had been paid to the miners in increased wages under the terms of settlement of the wages dispute last year a total of £4,317,903. The colliery owners have, in other words, paid out 2½ times the amount of money received from these voluntary increases."

British Chemicals and Their Manufacturers

1937 Edition*

This handsome book has been published by the Association of British Chemical Manufacturers to provide purchasers in all parts of the world with information on the products manufactured by the Association. To expedite this purpose the publication employs six languages.

The Association is incorporated under the British Companies Law by licence of the Board of Trade. It is not itself a trading concern, and it makes no profit on any business transacted by its members. It does not interfere in any manner with the business arrangements of its members, or discourage in any way their dealing direct or through merchants or other established channels. As is well known, all members of the Association are *bona fide* British manufacturers of chemical products, and every member has declared that he is the actual maker of the products against which his name appears.

The book is obtainable gratis by enquirers who are genuine purchasers of chemicals; copies, however, are only issued from the office of the Association to such enquirers, and not to intermediaries, in particular, booksellers.

* London: The Association of British Chemical Manufacturers, 166 Piccadilly, W. 1, pp. 466.

Experiments in Hop-Drying by Gas at Hawkhurst

Experimental hop drying has been carried out during the last season by the Industrial Section of the Gas Light and Coke Company, in co-operation with the Hawkhurst Gas Company, and some highly informative and encouraging results have been obtained.

By A. H. BIRD,
of the Industrial Appliances Workshop and Showroom, Watson House.

Since the introduction of the hop plant from Holland in the sixteenth century there has been evolved in the English oast houses a technique of hop drying which may be better regarded as a combination of art and traditional procedure than a scientifically conducted process, and stories are told of certain old dryers who never fail to produce the perfect hop, no matter how unfavourable the season, by resort to secret practice. It is not surprising that discoveries of effective methods of drying should be closely guarded, for in a large measure the quality of the product is conditioned by the drying. Aroma and appearance count for a lot in the market, and the latter quality is particularly dependent on drying conditions.

The oast house or kiln in which the drying is done is usually a brick-built structure, circular or square in plan, and covered by a conical or pyramidal roof capped by a large cowl. The cowl is pivoted and is fitted with a vane so that it always turns back to wind. An open floor formed of battens secured to joists divides the kiln into two rooms. The upper storey is accessible from storage lofts, one or more of which adjoin the oast houses. Over the floor of the upper or drying room is spread a hair mat of open weave, and on this are spread the hops to be dried. The lower room contains the heating apparatus and is accessible from the ground floor.

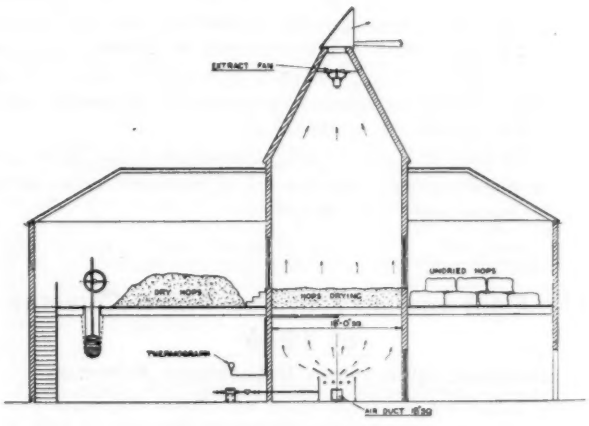
For generations the drying of hops in these oast houses has been effected by allowing the products of combustion from open charcoal and anthracite fires in the lower room to ascend through the bed of hops on the drying floor and eventually pass out of the cowl at the top, the natural convection being assisted by the pull created by the cowl. It will be observed that the maximum air flow is governed largely by the strength of the wind, but it can be reduced by closing sliding doors on the fresh air inlets to the lower room. The temperature varies according to the amount of fuel being consumed and on the air flow. Thus, by judicious control of these variables in accordance with the vagaries of the wind, a practical dryer can maintain the required conditions within safe limits, although a thermographic record taken on a not too favourable day might reveal some surprising fluctuations.

A certain amount of sulphur is burned in pans near the fires during the initial stages of the drying, and has the effect of improving the appearance of the product. To hasten the process and to ensure that the hops at the bottom of the bed are not scorched while those at the top remain green, it is necessary to turn them. This is often done by a man shuffling his feet through the bed.

During the last decade the English hop grower has moved ahead of tradition and has applied scientific methods to the cultivation and marketing of his produce, benefiting considerably by his enterprise. It is therefore not surprising that he welcomes a more scientific treatment of his drying operation, and, backed up by the Agricultural Colleges specializing in his crop, he has given a great deal of encouragement and willing co-operation to experimenters in this field.

The experiments by the Industrial Section of the Gas Light and Coke Company were conducted in an ordinary oast house shown diagrammatically in the accompanying illustration. Originally it had been heated by open fires; later an indirect oil-fired heater had been installed, and a 36-in. power-driven fan fitted underneath the cowl. No other alteration to the plant was made except the substitution of a gas-fired heater for the oil-fired heater. The gas-fired unit consists of a simple direct-fired air heater, fitted with bar burners with luminous jets, and this stands in the centre of the lower room. Two 18 in. by 18 in. air ducts, each fitted with a sliding door, run from openings in the outer walls to the inlet of the heater. Above the outlet from the heater are deflectors arranged to distribute the hot air evenly over the whole drying floor area. Thermostatic control could be usefully employed on this installation, but during the experiments hand control only was used. Temperatures were measured and recorded on a thermograph.

The work of drying proceeds in the following manner: Freshly picked hops are spread evenly over the floor of the drying room to a depth of 12 in. to 18 in., according to the load available. In the kiln in question a load of 30 pokes* was considered light and one of 60 pokes heavy. As soon as the loading is finished the burners of the heater are lighted and the fan is put into operation. A large volume of air is induced through the ducts and passes through the heater, thence over the deflectors and up through the hops, and is ultimately ejected through the cowl. The temperature is maintained about 120° F. during the first few hours' run, and during this time sulphur is burned in the mouths of the inlet ducts, the products of its combustion mixing with the induced air. About a half pound of sulphur is burned for each poke of hops being dried. After about three-and-a-half hours, but according to the condition of the hops, the temperature is gradually raised to 140° F., at which it is maintained until the whole load is dry. The time of drying varies between 9½ and 12 hours. An indication of the approaching condition of dryness is given by the "feathering" or opening of the hop petals, but the final decision rests with the dryer, who through long



Oast House with Gas-Fired Air Heater.

experience can detect by the feel and appearance of the hops degrees of dryness not perceptible to the unskilled. When the load is declared dry the fan and burners are shut off, and the hops are discharged on to the loft floor to cool. They are subsequently pressed into "pockets" or large sacks, each holding 1½ cwt., ready for despatch.

The results obtained show that a consumption of 8 therms per cwt. can be regarded as an average for a whole drying season. If gas is available at 6d. per therm, the net fuel cost is but little above that of anthracite coal. The capacity of a kiln is increased, a more uniform product obtained, and spoilage due to faulty drying need not occur. In addition, the turning operation, with its consequent damage to the crops, is eliminated. In comparison with an indirect-fired oil unit the net fuel cost is in favour of oil, but this apparent disadvantage is outweighed when due allowance is made for the big difference in the initial costs of the installation, depreciation, and running repairs, especially when it is remembered that the plant is in use for only one month per annum. There are also direct-fired oil heaters available which could, no doubt, show lower fuel consumption figures than the aforementioned type. But in spite of the assurances of the advocates of these

* 1 poke = 10 bushels.

appliances, their use does involve risk of spoilage inseparable from certain characteristics of the products of oil combustion. The present average price of hops is £9 per cwt.

Although hop growing is limited to a few counties and the number of oast houses near a gas supply is also limited, it is hoped that the success of these experiments will be of special interest to undertakings who are in a position to develop this new and hitherto unexploited use for gas.

The Gas Light and Coke Company wish to record their thanks to Mr. J. Santer, Chairman of the Hawkhurst Gas Company and owner of the oast house, for his willing co-operation, and to Mr. J. B. Hyde, Managing Director and Engineer, for his valuable services during the experiments.

Trade Notes

Babcock and Wilcox Stokers.

We have received from Messrs. Babcock & Wilcox, Ltd., Babcock House, Farringdon Street, E.C. 4, a copy of their new booklet entitled "Stokers." This publication, which has an introductory historical survey of the development of the mechanical stoker, in which the Company has had experience since 1883, details features of the Company's stokers which were developed with the sole idea of producing a sound product based on the results obtained in many thousands of installations dealing with all classes of fuel. Styles 31 and 28 stokers are particularly applicable for coke.

A Large-Scale Cooking Apparatus List.

The special list dealing with large-scale kitchen apparatus, just issued by Radiation, Ltd., is a very comprehensive production. This is the first occasion on which all the firm's best large-scale apparatus have been described and illustrated in a single list; and the publication should be of considerable value to gas undertakings. Tucked away in a pocket inside the back cover is a small list, unillustrated but giving prices, which will provide a handy reference for the salesman.

Every type of gas appliance for the hotel, restaurant, caterer, or baker finds its place in this list, while the services of the technical staff of Radiation are always available for preparing plans and layouts of apparatus to meet any requirements, and are at the disposal of all those who have large-scale catering problems to solve.

The Powers-Samas Magazine.

"How the Powers-Four Helps the Distribution and Sales Staff of the Brighton, Hove, and Worthing Gas Company" is the subject of an article in this month's issue of *The Powers-Samas Magazine*. The publishers acknowledge their indebtedness for this interesting article to Mr. A. G. Cottell, Accountant of the Brighton, Hove, and Worthing Company, for permission to publish it. The article was originally written for the Company's Co-partnership Magazine.

The Powers-Samas Magazine is published by the Powers-Samas Accounting Machines, Ltd., Powers-Samas House, Holborn, E.C. 1. The Powers-Samas punched card system of accountancy was dealt with in the "JOURNAL" for July 11, 1934, when we published an article on "Automatic Accounting for the Gas Industry."

Running Gasholder Repairs.

"If a gas engineer is sufficiently acquainted with the construction and correct working of gasholders to be able to appreciate when the advice of an expert is required, and to benefit by that specialist's report and suggestions, he is, in my opinion, reasonably well informed on the subject." This was the conclusion of a municipal gas engineer's reply to the suggestion of a member of the gas committee that the appointed Gas Engineer should be capable of giving a report on the several gasholders of the borough council. This story, which is claimed to be true, is included in an exceedingly sound and practical publication entitled "Specialist Inspection of Gasholders" which we have received from Mr. Leonard Bott, Structural Engineer and Gasholder Expert, "Rosslyn," Crewe Road, Alsager, Stoke-on-Trent.

Many practical examples of the work carried out by "Bott" methods and materials are given in the booklet. One very striking example concerns a gasholder that had actually been condemned by the manager of the undertaking. All the seven bottom guide carriages were off, and large holes were left in the sheets. A photograph shows the holder at its highest under the defective conditions, and, although but 60 ft. in diameter, was 3 ft. 4 in. out of level. The holder had been in that condition for over six years. While the holder was working, seven new bottom-row sheets with welded-on carriages were fitted to the holder by means of "Bott" patent bolts. As a result of the repairs the holder is good for another ten years, and can now be operated to its full height, which means that 7,500 cu.ft of storage was reclaimed.

The principle of the ingenious "Bott" bolt for fixing patches is explained and illustrated, and the micrometer gauging of sheets at all positions with the holder working is demonstrated. We understand that the gas undertakings of the British Isles are being circularized with the booklet.

Athletic and Social

Cannon's Children's Party.

Over 130 children of the employees of Cannon Iron Foundries, Ltd., Deepfields, were entertained at the Annual Party on Saturday afternoon last. The Sports Pavilion was attractively decorated, and the children thoroughly enjoyed the splendid tea prepared by the ladies.

The General Manager (Mr. W. R. Hawkins), Works Manager (Mr. W. L. Johnston), and Mr. W. E. Benton, M.Sc., were present, and gratitude to the Directors and others for their kindness was voiced by one of the youngest guests present.

When the hearty appetites of the children were satisfied, the Hall was cleared and transformed for games and competitions, interspersed with community singing conducted by Mr. H. Hughes. At the close of the proceedings each child was handed a present from one of the three Christmas Trees, by Santa Claus.

Houghton-le-Spring Gas Company — Employees' Dinner.

The staff of the Houghton-le-Spring District Gas Company held their Second Annual Dinner on Wednesday evening, Dec. 23, in the Colliery Hotel, Hetton-le-Hole.

After dinner Mr. J. Tindale (Foreman), who was in the Chair, proposed the toast to their Majesties, the King and Queen. Mr. G. W. Martin (Engineer and Manager), proposing the Toast of "The Company," observed that, with all the employees pulling their weight, he hoped that 1937 would be a prosperous year both for the Company and its work-people.

After the speeches followed a very enjoyable musical evening, the harmony being provided by ten of the Company's employees. At the close, a hearty vote of thanks was passed to the Directors of the Company for their kind hospitality.

Plymouth and Stonehouse's New Bowling Rink.

Colonel R. L. Norrington, Chairman of the Plymouth and Stonehouse Gas Light and Coke Company, opened the new indoor bowling rink on Monday, Dec. 28, by sending down the first wood. He said the Directors were very keen on promoting every form of sporting recreation among the Company's employees, and were anxious that as many of them as possible should use the rink. He expressed the hope that regular players of the game would persuade others to take part in it.

The Chairman of the Recreation Club, Mr. W. J. Walters, thanked the Engineer and Manager, Mr. R. J. H. Clark, for the help he had given in the preparation of the new rink, of which he said the Committee was very proud, not so much because it was the first of its kind in Plymouth, but because of the combined work the members had put into it. Mr. L. J. Maddock, Secretary of the Club, and Mr. H. J. Board, Treasurer, took part in the proceedings, which concluded with an exhibition match between teams of Devon County players and Club members.

Gas Undertakings' Results

Port Talbot.

The working results of the Port Talbot Gas Department for the year ended March 31, 1936, show that the gas made amounted to 212,964,200 cu.ft., gas sold totalled 195,318,000 cu.ft., gas unaccounted-for was 15,670,000 cu.ft., or 7·35%, as compared with 16,300,200 cu.ft., or 7·9%, the previous year. The gross profit was £15,541 and, after paying loan charges and income-tax, the net profit was £6,565. Capital expenditure financed from revenue amounted to £4,498. The balance carried forward on appropriation account was £11,386, as compared with £9,918 brought forward at the commencement of the year. The total value of appliances sold during the year was £16,937, amounting to £1·96 per consumer. This compares with £9,714 the previous year, being an increase of £7,223. Over 24 new consumers were connected during the year, bringing the total to 8,614. The gas consumed per consumer is 22,672 cu.ft., as compared with 22,202 cu.ft. the previous year, being an increase of 470 cu.ft. per consumer. The total coal used was 9,890 tons. The gas made per ton of coal used was 91·2 therms. Reductions in the price of gas for industrial purposes and public lighting have been made during the year. Also, the two-part tariff recently introduced will mean a further substantial reduction to domestic consumers.

THE AUSTRALIAN GAS INSTITUTE

Extracts from the

Presented at the Ninth Annual Convention of the Institute held at Adelaide from Nov. 24 to 26, 1936

Presidential Address

of G. M. O'DEA

(General Manager and Secretary of the South Australian Gas Company, Adelaide)

It has often been suggested that the Gas Industry could combine the production of low-temperature coke with that of gas manufacture. While there doubtless will be attempts by individual gas undertakings to place on the market supplies of free burning smokeless fuel, it is doubtful whether it will be possible so to balance the production of low-temperature coke and the production of gas as to lead to a wholesale combination of the production of these two fuels. Under any scheme of town gas production involving low-temperature carbonization it will be necessary to market low-temperature coke to the extent of some two to three times the amount of high-temperature coke when producing a given quantity of gas. Moreover, if the cost of gas manufacture is to remain the same, the larger quantity of low-temperature fuel must command a price appreciably in excess of the high-temperature coke.

It seems safe to conclude that gas manufacture for a long time to come will remain as a high-temperature process, and any development in the gas-works of Great Britain towards the production of low-temperature coke will be in the installation of self-contained low-temperature plants on the operation of which the manufacture of gas will in no way depend. There will undoubtedly be a number of individual low-temperature plants erected probably at collieries which will sell their solid product in the open domestic market. The fact that small quantities of low-temperature coke are being produced at the present moment under certain favourable conditions at a profit is no criterion that these favourable conditions will remain in face of a large extension of the supplies of low temperature coke.

High-Temperature Carbonization.

The improvement in the coke market and the extension of the process of removing benzole from coal gas have had the effect of curtailing the amount of water gas which is produced on gas-works, and it is likely that this tendency will continue in the immediate future. It is probable, moreover, that there will be further replacements of horizontal retorts by intermittent verticals and continuous vertical installations.

The former type of plant has been adopted mainly in those districts geographically situated where highly swelling coals are the most economical raw material and where a relatively rich coal gas is required. Any developments in the intermittent vertical type of carbonizing plant will be along the lines of increasing their capabilities for the production of water gas. Developments are taking place in the design of the continuous vertical retort so that it should be able with greater ease to handle the highly swelling coals. A factor which is increasing the favour with which continuous vertical retorts are generally considered in Great Britain is the enhanced value of tar, particularly of the creosote fraction, consequent on the introduction of the hydrogenation process for the production of petrol.

It is recognized that the tar from continuous verticals contains a greater proportion of the creosote fraction and is more adaptable to the hydrogenation process than other types of high-temperature tar, and it is probable that this will tend towards an extended adoption of the continuous vertical retort.

Australian Gas Coal.

One cannot leave the subject of gas production without referring to the fortunate position of the Industry in Australia with regard to the supply of Australian gas coals, the exceptionally good quality of which over the past quarter of a century demands special mention. Mined from some nine or ten principal collieries at Maitland, New South Wales, ample supplies are available. On the average they maintain 40% combustible volatiles, an ash content of from 4% to 6%, and a sulphur content of 1% or under —standards which, for gas manufacture, are probably unexcelled in any other part of the world.

These coals are used at all the principal gas-works in Australia, excepting those in Brisbane, where Queensland coal, mined in the vicinity of Brisbane, is used. Until comparatively recently high wages and high transport charges have resulted in high prices for coal, although this has merely culminated in Australian Gas Engineers successfully accepting the challenge to obtain the very best carbonizing results. In fact, 20,000 cu.ft. of 500 B.Th.U. gas (100 therms) to the ton has been obtained, while up to 18,000 cu.ft. of 500 B.Th.U. gas (90 therms) with up-to-date carbonizing plant is expected by most engineers. In addition to the high quality of the coal, the close relationship between the interests controlling most of the gas coal mines and the interests controlling the bulk of Australian shipping has provided, and is maintaining, an excellent supply and transport service, in which the Gas Industry is indeed fortunate.

Legislation.

While it does not appear that the Industry will be subjected to further restrictive legislation, there is definite need for us to promote a policy of securing constructive legislation with a view to facilitating future progress. Every gas undertaking should have the right:

(1) To trade on equal terms with competitors.
(2) To refuse supplies to unprofitable consumers.
(3) To finance and adopt accounting procedure in conformity with modern needs and practice.
(4) To resist any competition promoted by Public Funds unless such is placed on an equal basis of cost in matters of taxation and the like.

A Parliamentary Committee to make recommendations for the protection and the promotion of the interests of gas undertakings should prove a valuable adjunct to the National Gas Association. Many of our present difficulties through legislation have come from the belief that the Industry considered the consumer to be only of secondary interest. We must strongly fight this impression. There is also an urgent need to combat any suggestion of the Industry being subordinated to political expediency, and to develop in our legislators not only a finer sense of the importance of the Industry in the National Economy, but also of the Industry's honest desire to render the best of good public service. There is to-day £20,000,000 invested in the Gas Industry in Australia. This is increasing daily, and the sincere efforts of the Industry to discharge faithfully the trust imposed in it by investors and consumers alike should be emphasized until they are accepted unreservedly throughout Australian political circles.

Budgetary Control.

The need for a prompt and precise financial gauge to measure the activities of any gas undertaking was never more positive than at the present time. The days of monopoly are gone. Each year new factors, including competition, bring unavoidable additional charges which make the balancing of the budget a matter for careful supervision and control. This, of course, is not peculiar to the Gas Industry, in which it is pleasing to observe the careful planning of expenditure and income as part of the machinery of management is receiving proper attention.

In the final analysis our undertakings are found to provide an adequate return on the capital invested, and although this factor may be ignored for short terms or during depression or adjustment periods, it is vital that due regard should be paid to the permanent financial stability as well as the public utility service aspects.

The Budget frequently represents the nerve centre to which all activities respond in a common plan of action. The last decade has seen a remarkable increase in the application of budgetary control as a means of co-ordinating the various activities of a given business towards a set achievement. Part of the functioning is the regular collection and interpretation of statistical data as a guide to the higher management in deciding future policy. These periodical returns and analyses should have their origin in an accounting and statistical department. They comprise

the proper segregating of charges into their true relationships and are dependent upon an adequate organization of office systems and recording data, which also should have their origin in that department. The securing of data for more exact financial control should be the constant aim. This financial control, however, should by no means retard enterprise nor curtail activity in any of the other sections of the undertaking, but rather be regarded by them as a welcome guide and assistance to their own successful functioning, revealing as it does the financial worth of every operation.

There is a difference between the old system of periodical profit and loss statements and the modern method of depending on a properly established system of budgetary control. Under the former there was the difficulty that only large variations in revenue or expenditure were noticeable, while under the more modern practice a yearly programme of production, sales, and finance is all carefully planned and related one to the other. This policy is now accepted by the most progressive utilities, as without it an accurate forecast of results is impossible. It has much in its favour, setting an objective for each Department, both as to results to be obtained and the cost of obtaining them, and encouraging them to realize that they are sharing a common venture and expected to pay due regard to the efficient functioning of other departments.

The effectiveness of budgetary control naturally depends upon the promptness and thoroughness with which the actual results are measured against the planned performance or standards set. Delay prevents policy decisions being made in time to have the necessary corrective influence.

Sulphur Content of Gas.

The keeping of sulphur compounds in the gas to a minimum plays an important part in efficient and satisfactory gas utilization; we are particularly fortunate by reason of the low sulphur content in our Australian gas coals. Until comparatively recently, I fear the Industry has failed adequately to estimate the value of giving a full and proper degree of attention to the all-important questions of efficient gas utilization and reliability of, and quality of finish in, appliances. To-day, however, this situation is changed, one of the most important of our recent developments in Australia being the progress made in these directions. The matter has been taken in hand with pleasing vigour by the National Gas Association, by the larger individual companies, and by the leading appliance manufacturers, and the results of the combined efforts—already considerable—have for some time been available. May both the appliance manufacturers and the Industry make the fullest use of this valuable work!

Rate Tariffs.

Properly so, rate tariffs engage more and more of the attention of the Industry daily, and valuable contributions appear in almost every Technical Journal. The splendid work of the American Gas Association in collating masses of data from its members is noteworthy. In Great Britain there appears to be some vigorous, although unco-ordinated movement towards establishing more progressive and effective ways of selling gas service, and tariffs are being designed in many original forms for the development of sales. It can be safely said that at present the number and variety of gas tariffs are legion, but surely this is all to the good.

The study of rate structure is an inevitable development largely brought about by competition and the neglect to study the fundamentals of cost in the earlier days of the Industry. It is one of the modern efforts to place gas undertakings on sounder commercial bases. The flat rate method did not properly appraise profit nor how it was earned. Unprofitable business must always result in unfair, and in these days impossible, burdens. The Gas Industry has pioneered and developed a wide heating service field, which, however, it can neither increase nor even retain if it disregards from a rate structure point of view the actual and potential competition already so evident. Our Industry is fast becoming organized to meet this competition and will no longer allow the best of its business to be taken from it because of failure on its part to apply sound rate structure principles, and by, for instance, compelling profitable business to carry even a portion of the price load resulting from unprofitable business.

In spite of what might be said by a large section of our Technical Press, the basis of tariff construction is a scientific one. While the cost of providing gas and service to each individual, or to each class of supply, is the principal foundation on which price tariffs must be built, expediency and the psychology of human nature are factors which cannot be altogether ignored and are invariably troublesome during the initial stages of any new tariff, especially if the obsolete flat rate is being discarded for something more equitable and useful.

The first Domestic Tariff in Adelaide was introduced as from Jan. 1, 1935. Its chief features are:

(1) The establishment of the Gas Unit (3,412 B.Th.U.) Standard of Price.
(2) The introduction of a low monthly charge for meter rent, quoted on a weekly basis; 64 units or less per month 6d. per week; over 64 and under 161 5d. per week; 161 units per month and over 4d. per week.
(3) A reduction of 22% in the commodity charge after the first 400 cu.ft. (64 units) per month.

The underlying purposes of the tariff were to quote gas service in a denomination comparable with its chief rival service, electricity; to charge meter rent in a form that would be least objectionable to consumers (existing legislation preventing the use of the term service charge), and to make a substantial decrease in the price for additional gas with a view to extending the service and developing a better field for the sale of further appliances for domestic use. The tariff has fulfilled expectations. Opposition to it is disappearing, and not only has the field for domestic gas been extended, but it continues to offer splendid opportunities. While under the Adelaide domestic tariff cost economics have not been slavishly followed, the basis of charge is now definitely far more equitable than the previous flat rate. Doubtless, as time passes, new conditions will arise and new tariffs, having simplicity in construction as a chief characteristic, will require to be designed to provide consumers with a cheaper service and to promote profits and stability in the undertaking.

Selection and Training of Workers.

Industry and commerce are busy to-day eliminating waste of every kind, and one of the principal sources of waste, both seen and unseen, is the human misfit, resulting in waste of effort, waste of time, and waste of material. How often do we see immense care taken to ensure that buildings, plant, and raw materials are chosen to yield the maximum, while the casual attitude prevails in the selection of workers!

Obviously on the right selection of workers very largely depends the success or failure of any commercial or industrial undertaking. What then can be done to ensure right selection, to put and keep the round peg in the round hole, the square in the square, and thus minimize the losses and the risk referred to? Four things are essential—the personal interview by a competent officer; the application of vocational tests carried out in a commonsense way, although efficiently; a course of training after appointment; and the fixed determination to transfer or dispense with those who, notwithstanding the measures adopted, are still human misfits.

The personal interview to be of any value must be planned on definite lines in keeping with the requirements of the undertaking. Preferably this interview and the vocational test should be carried out by different persons, who—and this is important—should be able to gain the confidence of the interviewed and set them at their ease. Rough handling, for instance, *may* bring out personality; very often it does not. It is quite possible to find out whether an applicant can hold his own without bullying—the day of the bullying type of *régime* is over—and the interview should be completed as quickly as possible.

The vocational test is probably of greater importance than the personal interview, and should first cover an examination for physical fitness for the class of employment by a qualified medical officer. This is equally important from the point of view of the applicant and the employer, as so often does engaging the right physical type spell efficiency, the unsuitable type inefficiency and ill-health of the worker, possibly accident or death.

The essence of good training is that it should begin with entry into works or office. Carelessness, untidiness, should be checked at the outset. Training in its most complete sense involves much more than the mere teaching of a certain job. Inculcating a "tidy" habit of mind at the outset is invaluable always thereafter, resulting in good discipline and a general orderliness that will be of benefit to all. "By their works shall ye know them." The employee who is accustomed to a good layout and to a neat and workmanlike handling of materials, tools, books, papers, or pen-and-ink, reacts to such conditions, and it is easily possible to alter the whole tone of even large bodies of workers by systematic training, and testing for training, on right lines. And probably of more value even than systems for the training of employees in large numbers will be found the training of those young executives who are to accept greater responsibilities in the future.

Selling.

Two of the most important aids to selling are persistent research as to gas utilization and the activities of Home Service Staffs, whose chief functions are, in the eyes of the consumer, to set the "Seal of Approval" on the newly installed appliance, to engender goodwill, and generally to stimulate the demand for further gas usage. Of what avail are the qualifications and efforts of directors, managers, engineers, chemists, accountants, and so on, if, for instance, the Home Service Demonstrator in cap and apron falls down on the job? The National Gas Association should as soon as possible arrange regular Interstate Conferences for Home Service Officials for the exchange of ideas and experiences; early attempts should be made to form Women's Gas Councils in the various States, and the gas education of youth in our schools should be an early objective.

The National Gas Association of Australia.

It affords me considerable satisfaction and pleasure to be the first President of our Institute to be able to report that the formation and functioning of the National Gas Association of Australia, as from Jan. 1, 1936, are accomplished facts—satisfaction because of the small part I was permitted to play in the formation of the Association, and pleasure because I feel that there is ahead of it a long life of great value to the Industry.

Since the birth of the Association there has been much to do, mostly initial in character, and what small difficulties have arisen are, in my opinion, but teething troubles. Even if it achieved little else, which is out of the question, the Association, as a central clearing house for the collection and circulation of information and experiences as between Australian gas companies and appliance manufacturers, would fully justify its existence. It will, however, continue to do much more than this. There are difficulties, some of our own making, confronting us, but there will be many more problems to face in the future, and although these will all be solved to the advantage of the Industry, the solution can, and will, be much facilitated by concerted action through the National Gas Association, whose members include not only undertakings making more than 90% of the town gas used in Australia, but also a large number of the principal gas appliance manufacturers.

Matters to which the Association has not yet been able to devote much attention include education in the Industry, protection against unjust legislation and unfair competition, the collection and circulation of statistics, the preparation of gas publicity films for common use throughout the various States, and other questions of equal if not greater importance. In the short time that has elapsed, however, much good work has already been accomplished, such as furnishing members with details of the research work carried out by various gas undertakings in Australia and New Zealand in problems of production and distribution since 1930, together with those at present being investigated, National advertising and publicity, the handling of industrial matters, and last, but by no means least, co-operative research and testing in relation to gas utilization, which in itself is but one more outstanding instance of the desire to render the best of service to the public.

A very satisfactory characteristic of the National Gas Association, as has always been the case with the Australian Gas Institute, is the desire to afford all possible advice and assistance to the smaller undertakings and their executives. Indeed, not only in Australia, but throughout the world, this is a pleasing feature in the Gas Industry, and one regarding which we are fortunate and may feel proud.

FOREIGN DEVELOPMENTS IN Low-Temperature Carbonization

[Contributed]

The position of low-temperature carbonization in other countries is, perhaps, significant as a forecast of the direction in which this branch of carbonization is tending abroad.

The greatest commercial developments have been in Germany, where there is the problem of dealing with low-grade fuels such as we do not use in this country and, in large measure, such as we do not even possess. These fuels comprise peat and lignite, both of which are completely non-coking, of low heating value, and contain large quantities of water which cannot be removed by any known commercially sound method. There is in Ireland a problem parallel to that of Germany, since that country possesses peat deposits but no coal worth speaking of. In England we have a problem which is not yet acute, but which must inevitably become more prominent as time goes on—namely, that of restricting the use of the best coking coals for metallurgical purposes and using non-coking, or poorly coking, coals for all other purposes.

There is the difficulty that collieries have been wont in the past to ask higher prices for large coal than for small coal, and the price asked for the coal has been graded by particle size rather than by the value of the material to the consumer. Sound scientific commonsense would suggest that this basis of price should be discarded in favour of one based on the composition and cost of mining and preparation. Our problem is primarily the disposal of the slack from non-coking and poorly coking coals. A speaker at the recent Chemical Engineering Congress advocated the use of such coals for gas making purposes and asked that fuel technologists and gas engineers should devote their energies to finding means whereby this could be done more successfully than the present method adopted in some carbonizing plants of using coking and non-coking coal. This problem was also raised at the Institution Meeting in relation to the desirability of finding methods of making gas without using high-grade coking coals.

It is interesting on this account to observe what has been done in Germany in the direction of utilizing the geologically young fuels that have proved so difficult to treat by other methods. The utilization of these coals has proceeded along three lines. They can be treated suitably so as to be used in the raw state as fuel; they are converted into water gas in specially designed generators, the gas being used as the raw material for the synthesis of alcohols, ammonia, and hydrocarbons; and finally the material is carbonized at low temperatures.

It is anticipated that the use of the raw fuels will decrease. The employment of brown coal for water gas manufacture is increasing and very large Fischer-Tröpsch plants are either working, or in course of erection, using brown coal for the manufacture of oil. The energy with which the problem of a home supply of oil is being tackled in Germany causes considerable emphasis to be laid on any oil produced from low-temperature carbonization of immature coals, but even with products as low on the carboniferous scale as brown coal it is recognized that no process can be an economic success unless the most is made of the solid residue of "coke." The low-temperature carbonization industry in Germany is, therefore, developing primarily in the direction of treating non-caking materials and in utilizing the solid products from these non-caking materials. In order to utilize the solid residue new markets are being sought and new methods are being introduced which will enable the products to be used in existing plants.

The Geissen Process.

One of the successful German processes is the Geissen, in which lignite, previously dried to 15% of water in an independent dryer, is heated in an oven containing an internal vertical revolving cylinder of a special iron alloy, which causes a continuous turning of the pieces of fuel as they pass down in a thin layer, and immediate withdrawal of the low-temperature carbonization products from the moving layer of fuel. More than thirty units of Geissen ovens, each having a daily capacity of about 150 tons (based on crude lignite with 50% water) have been erected in Germany. The largest plants of this type are coupled with power stations.

In the Lurgi system the operation inside the oven is divided into three distinct zones: (1) Complete drying of the fuel, (2) low-temperature carbonization, and (3) cooling of the semi-coke. An even effect of the low-temperature carbonization is assured by the very uniform distribution of the heat-carrying gases over the whole cross-sectional area of the oven, which is vertically subdivided into two

shafts, and by preventing the fuel from separating into particular sizes. Only heat-resisting materials are used for the construction of those parts where higher temperatures are applied. Forty Lurgi ovens, each having a daily capacity of 500 to 600 tons (based on raw brown coal) are in operation or under construction in Germany, and a further fifteen ovens have been erected abroad.

By comparison with these large outputs, the plant that has been installed for the treatment of bituminous coal is small. It appears that for bituminous coals and for lignites, and especially for all non-coking material, it is considered that the revolving retort is unsuitable, because it is held that in carbonizing true coal a contraction under a certain pressure must be effected for the purpose of producing a solid and dense semi-coke from a coal having a tendency to swell and to form large pores during low-temperature carbonization. Since lignite and oil shale, on the other hand, have a strong inclination to develop dust, they must as far as possible be treated in stationary charges, so that the tar expelled will not be contaminated with dust and its further treatment thereby rendered a very difficult, if not an impossible, task. By the revolving retort these requirements could not be met, but these considerations would, of course, be nullified so far as concerns the smallness of the size of the product if resort could be had to briquetting. The difficulty in dealing with coking coals in rotating retorts has led to the use of rectangular externally heated chambers constructed of steel plates and protected against local over-heating. Steel is suitable for the purpose if the ovens are operated continuously and so long as the temperature of the metal does not exceed 600° or 650° C., a condition which can best be safeguarded by employing no direct flame heating. This system is employed by Krupps, but so far as is known only two of these plants, each having a daily capacity of 50 tons of coal, are operating on coking coal.

Further Extension Hampered.

Though there is an abundance of bituminous lignite deposits in Germany, the low-temperature carbonization industry has been hampered in its further extension by several circumstances, of which the marketing of the semi-coke is the most prominent. Fuel is valued on the market not only on the strength of its potential heating power, but in an equal measure by its physical condition. The low-temperature carbonization of lignite yields a semi-coke, or char, high in calorific value, but small-grained or brittle. Such coke, or char, has a certain market for domestic use in special stoves, but this market cannot be extended. To solve the semi-coke problem, new ways had therefore to be found with a view to extending its use—(1) by endeavours to find new markets for the semi-coke, and (2) by improving its physical condition.

One of these new uses for the semi-coke is to operate the low-temperature carbonization plant in conjunction with the boiler house of a power station. For this purpose new boiler furnaces had to be constructed capable of effecting good combustion of the small-grained semi-coke. The zone-travelling grate with forced draught, the mushroom furnace, the adaptation of powdered-fuel furnaces to this coke, and finally the development of a universally applicable powdered-fuel firing arrangement, have all helped to overcome the difficulties. These types of furnace and grate permit the combustion with high efficiency of any semi-coke. This development, proceeding apace with an increase in the capacity of the low-temperature carbonization ovens, and at the same time the reduction of the operating costs of the low-temperature carbonization plants, paved the way for coupling low-temperature carbonization plants with the boiler plants of power houses.

Since the power stations demand a cheap fuel, which, based upon its potential heat value, must not be more expensive than the available fuel in the raw state, this development can count on success only if the mine, the low-temperature carbonization plant, and the boiler house work in close co-operation, with the object of reducing the costs all round so as to create the basis for economically sound operation.

In order to render low-temperature " coke " from non-coking material suitable for domestic purposes the material can be briquetted, but in this case the briquettes should be stoved, as is done in a well-known British process, operating on non-coking coal, before being sold. In another German system, the improved Lurgi-Krupp process, which has recently been applied in two newly constructed plants, the lignite to be subjected to low-temperature carbonization is first artificially dried to a water content of 6 to 8%, its grain being reduced at the same time to the size of powder. In a combined drying mill, the wet raw lignite is subjected to the effects of a current of gas of 900° to 1,000° C. The fuel is dried in suspension within a very short time, and by the rapid explosion-like liberation of the water it is simultaneously powdered. The fuel drops from the dryer into a grinding fan, in which it is subjected to additional pulverizing. The mixture of drying gas and dried powdery fuel is separated in a dust-extracting arrangement. The dried powder is cooled and subjected to briquetting, a pressure of about 2,500 atmos. (35,000 lb. per sq.in.) being applied. These briquettes are subsequently transferred into the Lurgi low-temperature carbonization oven. They preserve their shape during low-temperature carbonization, except for some shrinkage, and are recovered as a solid lump semi-coke. This coke can be varied in its contents of volatile matter to suit requirements. Even with a low content of volatile matter its reactivity is very high. This semi-coke ignites easily, it preserves its shape during combustion, and does not become extinguished even if the combustion air is reduced considerably. It is thus a widely adaptable fuel for which there is sure to be an extensive demand.

Utilization of Slack Residue.

It has been stated that the solution of the problem of utilizing the slack residue from non-coking materials opens the way to a very great future extension of low-temperature carbonization in Germany, but the problem is not regarded as being completely solved as yet. While the char consumed in boiler houses and by the gas producers does not affect the fuel market, the large-sized semi-coke is compelled to displace other fuels and will to a certain extent disturb the balance of the fuel market. It will of necessity affect the use of metallurgical coke and probably to a larger degree the consumption of brown-coal briquettes.

These considerations are important from the point of view of possible repercussions in this country. It is well known that coke from a non-coking coal is considerably more reactive than is coke from a coking coal. The younger the coal geologically, the more reactive is the coke produced from it. It is evident that once those engaged in low-temperature carbonization recognize that the system is best used to treat non-coking material there will be placed upon the market a great quantity of coke produced from non-coking coals, very reactive and having wonderful combustible properties. The writer had the privilege of seeing some coke briquettes of this character burning in the open grate a short time ago, and there can be no question that this material is superior to anything now being produced by high-temperature carbonization. The writer would be disposed to say that it was also superior to anything produced by low-temperature carbonization, but in view of the desirability of conserving coking coals for the metallurgical industries it would appear that the low-temperature carbonization of coking coals to produce coke for the domestic grate cannot be defended on general grounds.

When material of this character is available there may also be a considerable increase in the use of gas producers for heavier vehicles, and some successful trials that have already been made have demonstrated the feasibility of a development of this character. Whether the carbonization and subsequent briquetting of non-coking coals will be a feasible proposition for gas-works remains to be seen. If the coke is produced in internally heated retorts the gas is of such low calorific value that it could not be considered by the great majority of gas engineers. This, however, does not rule out the possibility that non-coking material might be carbonized in externally heated retorts at higher temperatures, and the coke produced made suitable for the domestic market by briquetting under very high pressure before the coal is charged into the retorts. It is recognized, of course, that processes of this character must involve increased cost, but it must be remembered that non-coking slack is cheaper to purchase than slack coking coal, and that the price that could be secured for highly reactive coal suitable for the open grate would be appreciably more than can now be demanded for gas-works coke. Against this argument there is the practical point that, for those who will install a coke-burning gas-ignited open fire, gas coke as now produced is reasonably satisfactory.

To sum up the present position, it seems doubtful whether any existing process is likely to enable gas-works to make use of 100% non-coking coal, though this is a possible development of the future. On the other hand, any large increased movement in the direction of treating non-coking slack by carbonization on the lines of German practice might be very disturbing to the position of gas coke, and which might even affect the position of the gas fire. It must not be forgotten that the largest German low-temperature carbonization plant newly constructed and in operation for some time now has a throughput equal to 10,000 tons of raw brown coal per day.

Review of the General Meeting of the Union Syndicale de l'Industrie Technique du Gaz en France

(*Continued from p.* 913.)

Carburetted Water Gas

Carburetted water gas formed the subject of two Papers. The carburetting index of petroleum oils was discussed by A. Alleaume, who prefaced his contribution with an extensive review of the work carried out by earlier investigators. A description was then given of a laboratory apparatus devised at Gennevilliers for the study of the thermal decomposition of gas oil and fuel oil. The apparatus embodies a small retort to which the oil under examination is supplied at the rate of 1 gramme per minute. The yield and calorific value of the oil gas, the yield and specific gravity of the tar, and the yield of coke are determined. Consideration was subsequently given to the methods which have been proposed for the assessment of the carburetting index of oils on the basis of the results obtained in carburetted water gas plant. The method adopted at Gennevilliers is that of the Providence Gas Company (Proc. Amer. Gas Assoc., 1927) with some slight modifications.

(1) The volume of *air* is taken as five times the percentage of free oxygen in the C.W.G. The nitrogen equivalent of the air is, consequently, four times this percentage.

(2) The volume of *products of combustion* is calculated from the nitrogen content of the C.W.G.—*i.e.*, as the difference between the nitrogen content of the gas found by analysis and the figure calculated under (1). It is assumed that $\frac{1}{6}$ of this difference represents CO_2 of combustion and $\frac{5}{6}$ of this difference CO of combustion.

(3) The volume of *blue gas* is made up of CO_2, CO, H_2, and a little CH_4. The CO_2 content of the blue gas is the CO_2 found by analysis less the correction calculated according to (2). The same applies to the CO content. The H_2 content is taken as 1·05 times the sum of the corrected CO figure and twice the corrected CO_2 figure. The CH_4 of the blue gas is taken as 1% of the total of the calculated CO_2, CO, and H_2 contents.

(4) The volume of *oil gas* is equal to the volume of olefinic, paraffinic, and aromatic hydrocarbons *plus* any surplus hydrogen over and above that represented by the calculated blue gas hydrogen *minus* the CH_4 correction calculated according to (3).

Laboratory cracking tests enable a selection to be made from the oils available on the market with a view to the choice of an oil which combines high thermal efficiency of oil gas production with a minimum of operating drawbacks. They also afford a broad indication as to the extent and sense of any alterations in normal operating conditions which a given oil may render necessary.

Reference was made to the fact that gas oil now tends to be an intermediate rather than a by product of the petroleum industry. Its price is therefore dependent on that of petrol. On the other hand, fuel oil is a true by-product of the manufacture of petrol and its price should therefore be more akin to that of solid fuel unless new and as yet unforeseen applications are developed. The price difference, which should, under normal conditions, become more pronounced in the future, might, when the time comes, provide ample justification for the regular employment of heavy oils in the Gas Industry in spite of the greater difficulties with which their use is attended. The solution may lie in a two-stage process—manufacture of gas oil followed by partial " reforming " in a carburetted water gas plant and enrichment with a fraction of gas oil not subjected to reforming. In this connection, reference is made to recent work by Nagel (Amer. Gas J., March, 1936) on the conversion of heavy oil into gaseous hydrocarbons containing fewer than four carbon atoms.

The second Paper, by G. Nérot and D. Silvestre de Sacy, dealt with large scale tests on five oils in a Humphreys & Glasgow carburetted water gas plant at Clichy. The oils employed were three gas oils normally available in the Paris district, a heavier gas oil derived from an Iraq crude and a light fuel oil. The plant was run under standard operating conditions, the chief characteristics being blow 2 minutes, run 3·5 minutes, oil injection 3 minutes, recovery of blow gas 0·5 minute, daily consumption of coke 25 tons, rate of steam supply 50 lb. per minute, quantity of oil injected 4·5 to 7·5 gallons per minute, make of gas per 24 hours 1·8 million cu.ft., temperature at base of superheater 700°-730° C.

The reason for the dilution of the carburetted water gas with blow gas was to enable the carbon monoxide content of the gas to be kept low, there being a statutory maximum to the carbon monoxide content of the town gas.

It was deduced, from the curves correlating the rate of oil injection with the calorific value and with the yield of oil gas, that the heavier gas oil required a relatively long contact time—*i.e.*, a slow rate of injection. It was thus not so readily cracked as were the three standard gas oils. Bad operating conditions with the fuel oil and the need for the shutting down of the plant after a week's run are ascribed partly to the difficulty of atomization of this oil. Virtually, only the lighter fractions of the oil were converted into oil gas, the remainder being largely converted into carbon and hydrogen. To obtain better results with this oil, it appears that an improved method of atomization and the amelioration of the cracking conditions, for example by elimination of the checker-work of the carburettor and superheater, would be necessary.

Conventional laboratory tests on the five oils indicated that the various indices in terms of which the carburetting efficiency of oils is expressed fail to give a completely satisfactory correlation with plant results, hence large scale tests afford the best criterion of the value of an oil.

All the oils showed the well-known phenomenon of hydrogen fixation, hence the thermal efficiency of oil gas production was artificially high. This was still the case when allowance was made for the amount of hydrogen fixed, the reason being that, in the particular plant in question, the period of oil injection does not extend over the whole of the run period. In the period during which the oil is not admitted, the gas comes in contact with the tar in the coolers and condensers and picks up light constituents from it.

Modifications to Gasholders to Enable a Straight Line of Calorific Value to be Obtained

According to M. Schweizer, the chief reason for the variation in the calorific value of the gas discharged from a holder is the failure to secure adequate mixing of the gas due to the low velocity of the incoming gas. A device was described whereby this difficulty is overcome. It consists in the application of a converging reducing section at the end of the inlet pipe in the interior of the holder space, the section having the form of a hollow truncated cone with an angle of 30°. Various forms of the device, which has been introduced in a number of works, were described. In an early form, the device was fixed by means of a bayonet attachment to the end of the gas inlet tube. This has the drawback of increasing the height of the inlet tube and the work of fitting the bayonet attachment involves a relatively long shut down of the holder. In a later model, the device is suspended in the inlet pipe from a bridge piece and is rendered tight at the wide, lower end of the cone with a packing of asbestos cord. In a third model, the device is also an internal one and embodies an outer cylindrical sheath which fits over the inlet pipe and forms a seal in the holder water.

In a form specially suitable for incorporation during the erection of a holder, the device is arranged as a Venturi tube mounted by means of a bayonet attachment.

The attachments are so designed that the velocity of the gas entering the holder space is raised to between 10 and 20 ft. per second. All the models are fitted with carrying handles to enable them to be readily fixed.

The loss of pressure caused by the device is only of the order of $\frac{1}{2}$ in. W.G.

The efficiency of the device was illustrated with reference to a small works in which the carbonizing plant consists of only three intermittent chambers which are charged at 7-hour intervals. The velocity of the gas entering the holder space was increased from 1·4 ft. per second to 10·3 ft. per second. As a result, the wide fluctuations in the calorific value of the gas discharged from the holder were completely smoothed out and a straight line of calorific value was obtained.

(*To be continued.*)

THE USE AND MAINTENANCE OF Refractory Materials

by
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(of the Derbyshire Silica Firebrick Company, Ltd.)

From a Paper delivered to members of the Western Junior Gas Association at a meeting held at Exeter on Saturday, Dec. 12, following an inspection of the gas-works. The PRESIDENT (Mr. S. B. Jones, Clevedon) presided.

The Institution of Gas Engineers has issued specifications covering the refractory materials for use in the construction of carbonizing plant. These constitute an efficient guide to the quality of the materials. Refractoriness, after-contraction or expansion, and size limits are carefully specified for the various types of material which have been classified according to their silica content.

In addition to the specified tests, others, such as refractoriness under load, true specific gravity (for lime-bonded silica bricks), porosity, permeability, action of carbon monoxide, slag resistance, and spalling resistance may be used. Although these have not yet all received absolute definition, they will materially assist in the proper selection of refractory materials.

Time will not permit of any attempt to discuss the testing procedure for the tests outlined above, but it can be said that with all these various tests available it is becoming more easy to discriminate between suitable and unsuitable refractory materials.

Jointing Materials.

In all structures built up in segments the weakest point is the joints, and it is to the joints that a considerable portion of retort failures are attributed. Too great stress cannot be laid on the necessity of having suitable jointing material. It was in the past considered desirable to have a cement which was above all else " workable "—that is, it should " butter " easily and adequately fill the joint space after the brick has been knocked into position, to form a reasonably thin joint. It has lately been considered axiomatic that the jointing material should have a composition approaching as closely as possible that of the brick material, so that when the setting was at working heat the retort segments would be knitted together to form a homogeneous mass. While this was found to be comparatively easy with fireclay and clay-bonded silica materials, it was a more difficult matter with lime-bonded silica retorts. To obtain a jointing material of approximately the same constitution as the lime-bonded silica brick precludes the use of clay, and the resulting cement, even if ground to a comparatively fine grain, would be difficult to work and would introduce doubts regarding its adhesion to the brick surfaces. Ideally, the jointing material must work easily to enable horizontal and vertical joints of uniform thickness to be obtained, it should have sufficient mechanical strength before vitrification to resist any tensile or shearing strains and should establish adequate contact with the brick surfaces at comparatively low temperatures by partial vitrification. It should be able to maintain contact with the brick surfaces during the working life of the setting in spite of the various stresses set up during the normal operations of charging, discharging, and scurfing with their attendant temperature fluctuations, and, finally, it should remain stable under superimposed stresses and be resistant to slag attack to a degree at least equal to that of the brick material.

The Refractories Research Sub-Committee of The Institution of Gas Engineers has realized for many years the importance of this problem, and valuable data is being obtained by those working on this subject. The evolution of testing apparatus for the examination of the strength of joints under compression and tension has been a considerable step forward. Recent work on the permeability of fired joints has indicated that the quantity of air which may pass through an apparently sound system of jointed bricks by way of imperfect contact between jointing material and bricks may be greater than that passing through the bricks and jointing materials separately.

There are several other aspects of the problem of jointing materials which require elucidation. One important point is to discover the cause of the apparent inconsistency in the degree of adhesion of the jointing material to the brick surfaces. On dismantling settings constructed of tongued and grooved segments, it has been found that on one brick the material had adhered to the grooved side and had left the surface of the under brick clean, while the reverse was found with the adjacent brick on the same course. It may be that variation in the nature of the brick surface has an important bearing on this.

Another important factor is the wet to dry contraction of the cement when placed between two bricks. If the nature of the contraction is such that the contact between the brick and one surface of the cement is entirely broken, it is difficult to effect reunion unless considerable pressure is exerted. In many silica cement mixtures there should be sufficient free quartz to give an expansile tendency to the cements at working temperatures in order to overcome the normal wet to dry contraction and maintain contact with the surfaces. Leakage is inevitable if the connection between cement and brickwork is unsound, and since leaks readily become serious on all carbonizing plants the attention devoted to this problem cannot be too great. It might be mentioned in passing that the addition of low-temperature fluxing materials to jointing cements is a practice to be avoided unless carried out under the closest supervision and control and with full knowledge of the conditions under which the cement is to be used and the reactions likely to occur.

Building of Plant.

Given that the most suitable materials and jointing materials have been chosen, the next problem of importance is the detailed construction of the retorts. The importance of the specification regarding size limits becomes immediately evident when construction of the setting commences. The building of the brickwork requires expert workmen and close supervision throughout erection to ensure that the proper expansion allowances are made and that these are not rendered useless by their becoming partially filled with brick chippings and pieces of dried cement.

Wood filling of the expansion space is undesirable unless these are only temporary measures during construction, the wood being removed as the erection proceeds. The thermal expansion curve for silica materials indicates that the majority of the expansion takes place before the wood material could be removed by burning, so that if wood filling is left in, the expansion strains will be transmitted direct to the outside walls. Corrugated paper is useful for expansion joints in silica settings. The disposition and extent of the expansion allowances should be the result of a combination of theoretical knowledge and practical experience, as serious results follow upon the use of both too small and too large expansion allowances.

Drying Out and Heating Up.

In general, contractors issue instructions for the drying out and heating up of the setting to working temperatures. In these instructions careful consideration has been given to the various critical factors which will influence the useful life of the brickwork. For instance, the tightness of the setting will depend materially upon the rate of drying and heating up. With the advent of high silica materials into retort settings it must be realized that the drying out and heating up involves much more than the expulsion of the moisture and the raising of the temperature of the setting to working heat. The three main allotropic modifications of quartz can exist in two or more forms determined by the prevailing temperature—that is, on heating, one form changes to another and, on cooling, the reverse action takes place. As each of these changes is accompanied by a rapid volume change, exhibited as expansion or contraction of the material according to whether the material is being heated or cooled, it is obvious that great care must be taken to avoid fluctuations of temperature within these ranges during heating up; otherwise severe strains will be imposed on the brickwork. These changes take place below red-heat and the importance of some definite control of the heating schedule will be obvious—thermometers and/or thermocouples should be used and temperatures recorded as frequently as possible. One cannot emphasize too strongly the necessity of maintaining a steady gradual rise in temperature, no falling off being permitted, and that there should be as small a temperature gradient as possible between different parts

of the setting. A possible means of reducing the temperature gradient through the brickwork during heating up is that of separately heating the inside of the retort.

Beyond 700° C. the rate of rise in temperature may be increased with safety and generally gaseous firing is resorted to. The total time taken to bring up a setting from cold to working heat may range from six to eight weeks. It is advantageous where possible to bring a setting up to its working temperature and maintain a soaking heat for, say, two or three days, as this will allow the joints to become reasonably well vitrified and the refractory materials to adapt themselves to working conditions.

When preparing for gas-making the initial charge of coke should be added gradually and the coke should be as dry as possible to avoid undue chilling of the refractory material of the retort face below the critical temperature mentioned.

There are a few points in connection with the general working of a retort system which have a considerable bearing on the life of the refractory materials. It is well known that coals of different classes require a variation in the carbonizing conditions to obtain the best results. Attention should be paid to obtaining regular coal travel and to ensuring that, where numerous brands of coal are used, these are carbonized in a reasonably constant mixture. Where, for instance, a carbonizing plant has sources of supply which consist of twenty different brands of coal it would seem necessary to employ some supervision to see that if there were any considerable variation in coking quality, ash content, or fusibility of the ash in the series of coals, there should be an adequate mixing of the coals so that no sudden change in the type of coal fed to the retort occurs. It has been possible to trace apparently inexplicable failures of refractory materials to the use, over a short period, of an excessive proportion of one or more coals out of the general supply which had low fusibility ash.

Maintenance of Heats.

No hard-and-fast rules are laid down for the various zonal temperatures in vertical retorts, but temperature in carbonization controls the rate of carbonization. Opinions vary on the question of the most economical temperature to use for certain coals. There are those who consider that carbonizing plants should be worked at maximum temperatures to obtain maximum throughput and believe that the shorter life obtained from the refractory will be compensated for by the lower working cost per ton of coal carbonized. Others believe that working at a lower temperature with a lower capacity per retort but obtaining longer life from the refractories is more economical.

It is not within the scope of this Paper to discuss these opinions, but from the point of view of the life of refractories it is important to state that whatever method of working is chosen, once the zonal temperatures have been fixed they should be strictly adhered to and controlled within narrow limits. It is not to the advantage of the retort structure to have the heats varying considerably.

Scurfing is said to be a necessary evil, but much of the evil may be eliminated by careful attention to certain points during the removal of the scurf. The burning of scurf is an exothermic reaction and the rate of combustion should be controlled to prevent excessive temperature at the retort surface; but when scurfing has been concluded the heats should be increased to prevent too great a lowering of the temperature of the retort face in certain zones.

It is important also to use dry coke when filling up. The scurfing of the retorts in heating groups, instead of singly, assists in controlling the temperature and the use of steam in scurfing has been found beneficial. Careful control of the flow of air through the retort while scurfing is more important still. Any manner of working the retort which can reduce the impregnation of the retort surface by scurf will help to minimize flaking troubles. T. C. Finlayson[1] has made some interesting observations on the relation of scurfing to flaking in his Paper on "Some Factors Influencing the Maintenance Costs of Carbonizing Plants."

The contractor aims at providing a plant which will be gas-tight over a reasonable number of years, and the Gas Engineer's aim is to keep it so.

Leaks may be caused by (1) unsuitable jointing material, (2) bad application of jointing material, (3) parting of joints due to differential movement of the setting, and (4) removal of the cement due to rapid temperature fluctuation. Remedial measures must be taken to check the leakage. In some gas retorts hot patching is more feasible than others, but it is generally considered that such remedies are only temporary. Hot spraying has also been tried with limited success. It is said that these methods are more successful for stopping holes than for refacing spalled surfaces. A. H. Clucas,[2] in an interesting Paper on "Leakage in Horizontal Retorts," showed that the effect of hot spraying or patching on retorts was very slight as regards reducing leakage and that the formation of scurf was of much greater value in this respect.

It is in the lower regions of vertical retorts, below the scurf region, where leaks are most likely to occur, and it is, therefore, often necessary to employ these temporary measures for sealing them up. One of the most important factors in relation to the use of hot patching cements is to avoid using compositions containing very fusible materials. Proprietary mixtures containing these easily fusible and corroding constituents are very harmful to the refractory materials.

Cold Patching.

It is a sound practice to take advantage of every occasion on which the retorts are let down to examine the interior and recondition them. Where the brickwork is defective to such an extent that pointing or surface coating would be of doubtful success, it is usual to cut out such portions and replace with new brickwork. In carrying out this type of repair it is essential that a jointing material suitable for the type of refractory should be used and that no addition to improve workability should be made without due trial of the effect under prolonged heating. The plugging of holes and pointing of the joints should be carefully carried out under the supervision of a responsible person, and, where necessary, a final coating or wash of a refractory cement should be given to the brickwork. There are several points to be watched in the choice of materials for pointing and surfacing of retorts. Since the main function of such materials is reasonable adherence to the brickwork at working face temperatures, it is desirable that the material should have low wet to dry contraction—that is to say, it should dry without cracking—a low temperature range for initial vitrification, a long vitrification range before actual fusion occurs, and similar thermal expansion movements to those of the retort material.

A rough guide to the suitability of a material for such a purpose may be obtained by placing a coating of about ¼ in. thickness on to the previously wetted and roughened surface of a sample of the retort material and, after drying under normal conditions, inserting it gradually into a combustion chamber operating at a temperature approximating to that at which it is assumed the retort surface is exposed. After remaining at this temperature for some time, say, 24 hours, the test piece is gradually withdrawn and the condition of the patch examined. If the patching mixture shows reasonable adhesion without excessive cracking and has vitrified to a hardness comparable with that of the brick surface without exhibiting obvious signs of fusion or reaction with the brick material it is reasonable to suppose that such a mixture can be used with safety and with considerable success.

It is only fair to the already sorely tried refractory material to avoid the introduction of a new source of danger by using patching cements containing viciously corrosive materials on account of their alleged adhesive and vitrification properties. The Author has examined materials recommended for this work which contain relatively high quantities of such materials as lead oxide, alkalies, and other strongly fluxing agents. There are certain proprietary mixtures which appear to give temporary satisfaction for hot and cold patching respectively, but it cannot be stressed too strongly that caution should be used before any type is extensively applied to the retort brickwork.

Effect of Shutting Down and Re-Heating.

Although it is desirable that the shutting down and re-heating of carbonizing plant should be cut down to a minimum it is obvious that, owing to the varying demands on the plant, shutting down of portions of the plant becomes necessary at certain periods. The danger arises from the stresses in the structure created by the cooling and re-heating of the settings. The only way to minimize these stresses and reduce the liability of damage to the refractory lies in paying the same care and attention to the cooling down and re-heating as was given to the initial heating up of the setting. It must be remembered that considerable stresses are induced in the setting if too rapid cooling is allowed to take place below 300° C. Settings should be so arranged that the cooling down or re-heating of one setting will not affect others still working—that is, settings should, as far as possible, be independently braced. Vertical and horizontal cracking often results from too rapid cooling or re-heating of beds of retorts. The same care should be given to re-charging the retort after re-heating as was given before to the initial charging of the retorts. Careful handling of the retorts in these processes may extend their working life by several hundred days.

Retort "life" is generally expressed as the number of working days. This basis of comparison does not give an accurate conception of the useful work done by a retort and hence by the refractory materials of which the retort

is composed. More accurate bases of comparison are obtained by use of the number of therms produced per retort or the amount of coal carbonized per retort. Such comparisons as the latter bring into focus the question of the advantages accruing from the working at high temperatures. It may here be mentioned that when intending to work at high heats it is better to "break in" the plant by gradually raising from the normal heats to those which are intended to be maintained.

The use of increased temperature for carbonization naturally tends to accentuate the wear and tear on the refractory material, and it becomes an interesting problem to decide whether it is more economical to work at high heats for a shorter period and cope with flaking, leakages, &c., as they occur, or to work at lower temperatures and minimize the wear and tear on refractories, bearing in mind the cost of refractories in relation to the coal carbonized per retort. Silica material has been rendered more reliable of late years, and in spite of certain inherent faults is still the most successful refractory material for modern carbonizing conditions.

It is by an interchange of information between producer and user of refractory materials that the former is able to improve his products to meet the changes in working conditions and the latter to extract the greatest use from them by fully appreciating the significance of the relationship between the properties of the materials and the treatment to which they are subjected.

[1] Finlayson, T. C., "GAS JOURNAL," Vol. 205, p. 148.
[2] Clucas, A. H., "GAS JOURNAL," Vol. 204, Nov. 1, 1933 (Supplement p 6).

Discussion.

The PRESIDENT (Mr. S. B. Jones) enquired whether it was necessary to take the same care in re-heating a setting after it had been shut down for minor repairs, as in first heating. Referring to thermal expansion, although it appeared that the bulk of expansion took place up to 500° C., experience proved that much expansion took place after that temperature had been passed. Could the Author explain this? Further, regarding the erosion of retorts, had the rate of throughput any effect on the slagging action of the coal ash?

Mr. R. WINSOR (Clevedon) asked if the temperature of the hot gases as taken with thermometers placed in the base of the producer uptakes and waste gas flues, when heating up a setting, were any indication of the temperatures of the refractories.

Mr. K. L. CLARK (Weston-super-Mare) enquired whether the Author had knowledge of harm done to retorts by the use of washed small coal containing moisture of the order of 10%. Also, had the alumina content of checker brick any influence on its ability to act as a cracking agent in C.W.G. manufacture?

Mr. G. E. MONSON (Plymouth) asked whether Mr. Oliver could explain the vertical rise of about 1-2 in. which took place in a retort setting 12 months after it had been working continuously.

Mr. OLIVER, replying to the various questions, said he considered it was not necessary in re-heating after repairs to give so long to the initial heating to 100° as in drying out new settings. The actual heating up would require the same care and attention as new settings, because the thermal expansion characteristics of the material would be the same. Regarding the second question, he thought the explanation lay in the heat lag in the various parts of the setting, which prevented expansion of the brickwork taking place in the same manner as that occurring in evenly heated test samples. The degree of erosion of the lower portion of vertical retorts might possibly benefit by increasing the throughput, as in certain temperature conditions the time factor was important in accentuating the degree of corrosion by ash. As the temperatures in flues were an indication only of the temperature of the hot surface of the brickwork, and not of the temperature throughout the brick, care should be taken in heating a setting, although the temperature of the flue exceeded the critical points for silica material. It had been found beneficial from the point of view of refractories' life in the top portions of the retorts to avoid excessive wetness of the coal. Replying to the point of high alumina firebricks for the carburettor of C.W.G. plants, Mr. Oliver considered that, provided the bricks were well fired to remove any liability to hydrocarbon disintegration, they would have properties suitable for this work. The query about the sudden expansion of a silica setting after twelve months' working could not be explained by any property in the materials of which the setting was constructed.

Mr. J. E. AKROYD (Swindon, G.W.R.) proposed a vote of thanks to Mr. Oliver for the Paper, which was supported by Mr. A. TRAN (Bath), and Mr. OLIVER replied.

An adjournment was then made to the Rougemont Hotel, where the Association enjoyed tea at the invitation of the Chairman and Directors of the Exeter Gaslight Company, thanks to whom were expressed by the PRESIDENT. Mr. W. N. WESTLAKE (Engineer and General Manager) replied.

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

Markets were hesitant at the outset last week on account of the latest news on the Spanish problem and the labour troubles in the United States. Towards the close, however, a recovery in Wall Street led to more confidence on this side and conditions became active again, especially in the more speculative sections. Gilt-edged stocks made some recovery, and home rails became firmer, while the leading industrials were strongly supported. In the more speculative sections, oils attracted a large following, and base metal shares recovered on the sharp rise which took place in copper and lead. The leading Banks made their preliminary announcements, which indicate in each case an increase in net profits and the maintenance of the previous year's rates of dividend.

The Gas Market received good support, and the business done was spread over a large number of issues. Prices on the whole remained firm and a few stocks appreciated in value. It is satisfactory to note that South Metropolitan ordinary followed up the previous week's small improvement and closed 2½ points higher at 118, while Imperial Continental registered a gain of 2 points to 149½. The best advance on the London Exchange was that of British 5½% preference which rose 4 points to 114½. At the Provincial Exchanges, both Bristol and Liverpool ordinaries hardened a point and Newcastle units recovered the 3d. lost a week ago. The only change of note in the Supplementary List was a drop of 10 points in the nominal quotation of Shanklin and Ventnor Consolidated to 175, business being done at 174.

In order to finance their latest acquisitions, the Directors of the Severn Valley Gas Corporation have offered to the shareholders the right to subscribe for additional ordinary shares of the Corporation in the proportion of one new for every four ordinary shares held. These new shares are offered at 22s. for each £1 share, and since the current quotation of the existing shares is 22s. 6d. the right carries with it a small bonus. Applications for the new shares, which rank for dividend from Jan. 1, 1937, must be made on or before Jan. 18.

The Colonial Gas Association has notified particulars of an issue of £100,000 4½% debentures redeemable at par in 1962. The whole of the issue has been taken up by Messrs. Grieveson Grant & Co., at 98½% net. The Association, whose head office is in Melbourne, owns or controls 28 gas undertakings and 4 by-product companies in Australia. Both the ordinary and preference shares are officially quoted in London and dealings are also allowed in the existing debenture issues.

Current Sales of Gas Products

The London Market for Tar Products.

Jan. 11.

The prices of Tar Products in the London market are generally unchanged:

Pitch, nominal at 34s. per ton f.o.b.
Creosote, 5¾d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 7d.; and 90/160 pyridine, about 8s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Jan. 11.

The average prices of gas-works products during the week were: Gas-works tar, 18s. 9d. to 23s. 9d. Pitch—East Coast, 33s. to 34s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 33s. to 34s.* Toluole, naked, North, 1s. 11d. to 2s. Coal tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅞d. to 5⅛d.; low gravity, 4½d. to 4⅝d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 7d. to 2s. 8d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Jan.* 9.

A steady throughput is being maintained in most departments and prices are firm accordingly.

Crude gas-works tar.—The actual value is 34s. to 35s. per ton *ex* works in bulk.

Pitch is uninteresting with values easy at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar continues to be quoted at 3d. per gallon f.o.r. for export, and 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Available supplies find a ready outlet and prices are well maintained. Specification oil, 5d. to 5¼d. per gallon; low gravity, 5d. to 5¼d. per gallon; neutral oil, 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—Supplies are decidedly limited and values are firm as under: Pale, 97/99%, 2s. 6d. to 2s. 8d. per gallon; dark, 97/99%, 2s. 3d. to 2s. 5d. per gallon; and pale, 99/100%, 2s. 10d. to 3s. 1d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Production is low and value remains unchanged at 5½d. to 6d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is lower at 1s. 3d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is now valued at about 10½d. to 11¼d. per gallon.

Motor benzole is unchanged at 1s. 2½d. to 1s. 3d. per gallon.

Pyridine.—Prices are nominal at 6s. to 6s. 6d. per gallon for 90/160 grade, and 7s. to 7s. 6d. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

		s.	d.		s.	d.	
Crude benzole	. . .	0	8½	to 0	9	per gallon at works	
Motor	,, . . .	1	2	,, 1	2½	,,	,, ,,
90%	,, . . .	1	3	,, 1	3½	,,	,, ,,
Pure	,, . . .	1	7	,, 1	7½	,,	,, ,,

Contracts Advertised To-Day

Cookers and Fires.
Lincoln Gas Department. [p. 112.]

Gasholder.
Timaru Gas, Coal, Coke Company. [p. 112.]

General Stores (Brass Fittings, Iron and Steel, Tools, Lead, Lead Pipe, Rubber Goods, Sulphuric Acid, Oils, &c.).
Blackpool Corporation. [p. 112.]
Dewsbury Corporation. [p. 112.]
Lincoln Gas Department. [p. 112.]
Stockport Gas Department. [p. 112.]

Malleable Fittings.
Lincoln Gas Department. [p. 112.]

Mantles.
Lincoln Gas Department. [p. 112.]
Stockport Gas Department. [p. 112.]

Meter Locks.
Lincoln Gas Department. [p 112.]

Meters and Meter Skins.
Dewsbury Corporation. [p. 112.]
Lincoln Gas Department. [p. 112.]
Stockport Gas Department. [p. 112.]

Oxide of Iron.
Lincoln Gas Department. [p. 112.]
Stockport Gas Department. [p. 112.]

Paints, &c.
Blackpool Corporation. [p. 112.]

Pipes (Cast and Wrought) and Fittings, &c.
Blackpool Corporation. [p. 112.]
Dewsbury Corporation. [p. 112.]
Lincoln Gas Department. [p. 112.]
Stockport Gas Department. [p. 112.]

Washing Machines and Boilers.
Lincoln Gas Department. [p. 112.]

Diaries, Calendars, &c., Received

Seasonable gifts in the shape of useful diaries, calendars, &c., have been received from the undermentioned friends, whose good wishes are heartily reciprocated:

Chemical Trade Journal and Chemical Engineer	Peckett & Sons, Ltd.
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STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 8.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Sept. 7	7⅞	8	Alliance & Dublin Ord. ...	169—174	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	92—97	...	...
557,655	,,	Aug. 10	7	7	Barnet Ord. 7 p.c.	168—173	...	...
300,000	1	Oct. 5	1·9⅞	1·4½	Bombay, Ltd.	26·—28·	...	26 10½—27/6
179,305	Stk.	Aug. 10	9½	9½	Bournemouth sliding scale ...	220—230	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	171—176	...	...
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	148—153	...	148
50,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	85—90	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	104—109	...	105
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128	...	126
357,900	,,	Aug. 10	7½	7½	Brighton, &c., 6 p.c. Con. ...	168—173	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	154—159	...	156—158
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	145—150	...	147
855,000	,,	Oct. 5	8	7	British Ord.	157—162	...	160
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	148—153	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	112—117	+4	115—115½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—114	...	...
200,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—102	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	80—85*	...	...
626,860	,,	July 20	6	6	Cardiff Con. Ord.	128—133	...	130
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	108—113	...	...
98,936	1	Oct. 19	2/-	2/-	Colombo Ord.	1⅞—1⅞	...	...
24,510	1	,,	1·4½	1·4½	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
739,453	1	Oct. 5	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/6—19/6	...	...
296,144	1	,,	1·3·30	1·3·30	Do. 8 p.c. Pref.	21/—23/-	...	...
1,775,005	Stk.	Aug. 10	5	5	Commercial Ord.	93—98	...	94½—95½
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	82—87	—1	82
286,344	,,	Aug. 10	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
807,560	,,	Aug. 10	7	7	Croydon sliding scale ...	158—163	...	161½—162¾
644,590	,,	,,	5	5	Do. max. div.	115—120	...	...
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	123—128	...	125
239,000	,,	Aug. 10	5	5	East Hull Ord. 5 p.c.... ...	108—111	...	...
184,555	,,	Aug. 10	6	6	East Surrey Ord. 5.p.c. ...	128—133	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	121—126	...	...
250,000	1	Nov. 16	4	4	Gas Consolidation Ord. ...	20 6—22 6	...	21/1½—22/-
250,000	1	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19 —21 -	...	...
19,284,128	Stk.	Aug. 10	5⅞	5⅞	Gas Light & Coke 4 p.c. Ord.	26 3—27/3a	...	26/4½—26/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.... ...	89—92	...	89—90
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref....	104—108	...	105—106
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb....	83—86	...	84—85½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb....	115—118	...	116—116½
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	114—117	...	114½—116
700,000	,,	Sept. 7	...	25/5⅛	Do. 3½ p.c. Red. Deb....	102—104	...	...
270,466	,,	Aug. 24	6	6	Harrogate New Cons. ...	128—133	...	...
213,200	,,	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	133—138	...	135½—137
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	147—152	+2	147½—151
223,130	,,	July 20	3½	3½	Do. 3½ p.c. Red. Debs....	92—97	...	95½
285,242	,,	Aug. 24	8½	8½	Lea Bridge 5 p.c. Ord. ...	186—191	...	...
11,751	,,	,,	10	8	Maidstone Gas 5 p.c. Cap. Stk.	190—200	...	...
63,480	,,	Dec. 14	3	3	Do. 3 p.c.Prp.Db.Sk.	79—84	...	...
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ...	185—195	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Aug. 24	5	5	M.S. Utility 'C' Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	...
360,075	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	121—126	...	...
125,000	—	Jan. 4	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	97—100*	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	80—85	...	81—82
225,000	,,	Aug. 10	7½	7½	North Middlesex 6 p.c. Con.	170—175	...	...
396,160	,,	Aug. 10	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Nov. 2	†7	†9	Oriental, Ltd....	168—173	...	...
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	165—170	...	...
504,416	,,	Aug. 10	8½	8½	Portsmouth & Gosport Cons.	178—183	...	180
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	114—119	...	115
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	118—123	...	119½
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...	23/-
454,510	1	,,	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	21/—23/-	...	...
133,201	Stk.	Aug. 24	5	8½	Shrewsbury 5 p.c. Ord. ...	145—150	...	...
90,000	10	June 8	‡3⅛	‡4	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2⅞	1/2⅞	South East'n Gas. Cn.Ld. Ord.	27/—29/-	...	27/6
845,511	1	,,	-/10⅛	-/10⅛	Do. 4½ p.c. Red. Cum. Pref.	21/—23/-	...	21/6—21/10½
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	20 6—21/6	...	21/1½—21/3
150,000	Stk.	Aug. 10	...	3½	Do. 3½ p.c. Red. Deb. ...	100—102	...	...
6,709,895	,,	Aug. 10	6½	5	South Met. Ord.	116—120	+2½	115½—119½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	145—150	...	145—147½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	104—107	...	105⅞—105⅞
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	83—86	...	83—83¼
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	113—116*	—1	...
1,543,795	,,	Aug. 10	6	6	South Suburban Ord. 5 p.c....	130—135	...	132
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	121—126	...	123
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	102—107	...	...
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	122—127	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	103—108	...	...
427,859	1	Nov. 16	1/2⅜	9⅜	S. Western Gas & Water Ord.	21/—23/-	...	21/—21/3
160,523	1	Oct. 19	-/10⅛	-/10⅛	Do. 4½% Red. Cum. Pref.	20/6—22/6	...	22/—22/3
110,000	Stk.	Dec. 14	4	4	Do. 4% Red. Deb. ...	100—105	...	104½
647,740	,,	Aug. 10	5½	5	Southampton Ord. 5 p.c. ...	113—118	...	117
121,275	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	100—105*	...	...
350,000	,,	Aug. 10	5½	5½	Swansea 5½ p.c. Red. Pref. ...	112—117	...	...
106,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101*	...	...
94,000	,,	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Deb. ...	95—100*	...	...
1,076,490	,,	Aug. 10	6⅝	6⅝	Tottenham and District Ord.	152—157	...	154—155
409,835	,,	,,	5⅝	5⅝	Do. 5⅝ p.c. Pref....	130—135	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	102—107	...	104
369,774	,,	Aug. 10	7	7	Uxbridge, &c., 5 p.c. ...	165—170	...	167½
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
1,340,521	,,	Aug. 10	7	7	Wandsworth Consolidated ...	159—164	...	160—163
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	124½—125½
500,000	,,	,,	...	...	Do. 4 p.c. Pref. ...	104½—107½	...	...
1,317,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	125—130	...	...
338,300	,,	,,	4	4	Do. 4 p.c. Deb. ...	102—107	...	...
499,735	,,	Aug. 10	7½	7	Watford and St. Albans Ord.	157—162	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
200,000	,,	Dec. 14	4	4	Do. 4 p.c. Red. Deb.	100—105	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	99—102	...	...

a.—The quotaion is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Jan. 8.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 20	6	5	Bath Cons.	125—127	...	...
1,667,250	,,	July 6	5	5	Bristol, 5 p.c. max. ...	119—121	+1	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101½—103½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101½—103½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125	...	...
274,000	,,	Aug. 10	5	5	Newport (Mon.) 5 p.c.max. ...	110—114	...	...
13,200	12	Sept. 7	8½	7	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	6	5	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	6	5	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Aug. 10	5	5	Weston-super-Mare Cons. ...	112—114	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 10	6½	5	Chester 5 p.c. Ord.	107—112	...	...
92,500	,,	Dec. 14	4½	4	Do. 4 p.c. Pref.	98—102	...	...
32,540	,,	,,	3	3½	Do. 3½ p.c. Deb....	90—95	...	...
41,870	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103	...	...
2,167,410	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	132—134	+1	...
245,500	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref. ...	101—106	...	...
306,083	,,	July 6	4	4	Do. 4 p.c. Deb. ...	104—106	...	...
106,280	,,	July 20	10	10	Preston 'A' 10 p.c.	198—208	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	137—147	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 10	8	8	Blyth 5 p.c. Ord.	164—166	...	...
732,000	,,	Aug. 10	5	5	Hartlepool G. & W. Cn. & New	125—127	...	...
2,061,315	,,	Aug. 10	5½	5	Newcastle & Gateshead Con.	26 6—27/-a	-/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	104—105	...	...
776,706	,,	June 22	3½	3½	Do. 3½ p.c. Deb. ...	100—102	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
209,820	,,	Aug. 10	8½	8½	South Shields Con.	172—174	...	...
299,542	,,	Aug. 10	6	6	Sunderland 6 p.c. max. ...	140—142	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 10	10	7	Derby Con.	185—195	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105*	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12*	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	117—122*	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	220—230	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	220—230	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—215	...	...
1,806,339	,,	Aug. 24	6	6	Sheffield Cons.	146—148	...	...
95,000	,,	July 6	4	4	Do. 4 p.c. Deb.	102—105	...	...

a The quotation is per £1 of Stock.

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Nov. 2	5	25/-a	Ascot Ord.	118—123	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	115—120*	...	...
312,083	1	Nov. 16	5	5	Assd. Gas and Water Ord. ...	21/—23/-	...	22/9—23/-
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	...
150,000	Stk.	Sept. 21	...	3½	Do. 3½ p.c. Red. Deb. ...	98—101	...	...
17,000	,,	Aug. 24	8	8	Bognor Orig. Ord. 'A' ...	175—185	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	175—185	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	145—150	...	...
37,440	,,	Aug. 10	10	10	Cam. Univ. & Town 10 p.c.max.	205—215	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	155—160	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	108—113	...	...
65,000	,,	Aug. 10	8½	7½	Eastbourne 'A' 5 p.c. ...	175—180	...	...
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	142—147	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	122—127	...	...
24,000	30	Aug. 10	8½	8½	Great Yarmouth 8½ p.c. max.	51—56	...	54
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	42—45	...	...
51,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	123—128	...	...
152,600	,,	Sept. 7	8	8	Guildford Cons.	200—210	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	114—119	...	...
68,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	120—125	...	...
156,600	,,	Aug. 24	7½	7½	Hampton Court Cons. ...	173—178	...	...
107,960	10	Oct. 5	5½	4	Mid Kent Ord.	8¼—9¼	...	...
230,940	Stk.	Aug. 10	10	10	Oxford & District Ord. ...	215—225	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	118
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	113—118	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Sept. 7	6½	7½	Redditch Ord.	133—143	...	...
166,850	,,	Aug. 10	9	8	Romford Ord.	168—178	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Sept. 21	5	5	Do. 5 p.c. Deb.	120—125	...	...
10,950	,,	Aug. 24	8	8	Ryde Ord.	165—170	...	...
136,191	,,	Aug. 10	7	5	Scarborough Ord.	126—136	...	...
27,825	,,	Aug. 24	8	8	Shanklin & Ventnor Cons. ...	170—180	—10	174
40,643	,,	Sept. 21	7	7	Slough Ord.	156—161	...	...
221,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	116—121	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	22/—24/-	...	...
28,866	1	Sept. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	22/—24/-	...	...
137,730	Stk.	Aug. 10	7	7	Southgate & Dist. 7 p.c. max.	151—156	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	120—125	...	...
117,228	,,	Aug. 10	6	5	Swindon Cons.	110—115	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	118—123	+3	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120	...	...
750,000	1	Oct. 5	5·52d.*a*	4	Utd. Kingdom Gas Cpn. Ord.	21/6—22/6	...	21/9—22/3
606,270	1	,,	2½	2½	Do. 4½ p.c. Prefd. Ord. ...	20/—22/-	...	20/3—21/-
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/6—23/6	...	22/—22/3
600,000	Stk.	Sept. 21	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—102	...	101
130,000	,,	Aug. 10	8	5	Wakefield Ord.	140—145	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	105—110	...	...
82,000	,,	July 20	6	6	Weymouth Ord.	105—110	...	...
98,384	,,	Aug. 10	6	6	Wolverhampton 6 p.c. Pref....	127—132	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	110—115	...	115
370,000	,,	July 20	6	4	York Cons.	110—120	...	...
90,000	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb. ...	108—113	...	...
133,640	,,	July 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	140—150	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	123—128	...	...
35,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	128—133	...	...

a Actual.

COMPANY NOTICES.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given that the Ordinary General Meeting of the Proprietors of this Company will be held at Southern House, Cannon Street, E.C. 4, in the City of London, on Wednesday, the 3rd day of February next, at Twelve o'clock noon precisely, to receive the Directors' Report and the Accounts of the Company for the Year ended the 31st December last; to declare Dividends for the same period; to elect two Directors in place of those retiring by rotation; and to elect one Auditor.

The Transfer Books will be closed for both Preference and Ordinary Stocks on and from the 20th day of January instant until after the Meeting.

By order,
F. G. BREWER,
Secretary.

Offices:
709, Old Kent Road,
London, S.E. 15.
Jan. 9, 1937

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that an Ordinary Meeting of the Commercial Gas Company will be holden at the Abercorn Rooms, Liverpool Street Station, in the City of London, on Thursday, the 18th of February, 1937, at Twelve o'clock noon:

To receive the Directors' Report and the Accounts of the Company for the Year ended the 31st December, 1936;

To declare a Final Dividend for the Year ended 31st December, 1936;

To elect Directors and an Auditor in the place of those retiring.

The Stock Transfer Books will be closed from the 19th of January to the 18th of February next, both days inclusive; and the Dividend will be paid on the 19th February next to the holders of Stock registered at the date of the closing.

By order of the Board,
E. H. HARMAN,
Secretary.

Offices,
Stepney,
Jan. 11, 1937.

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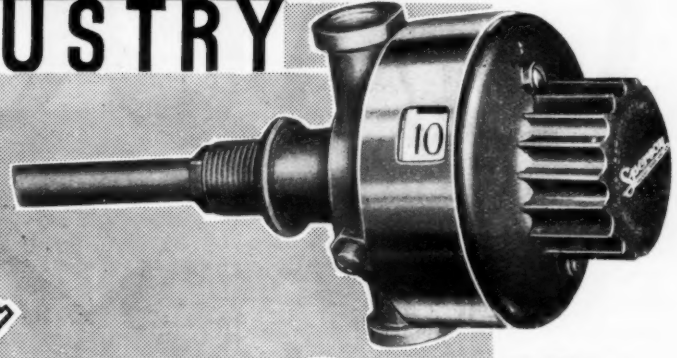

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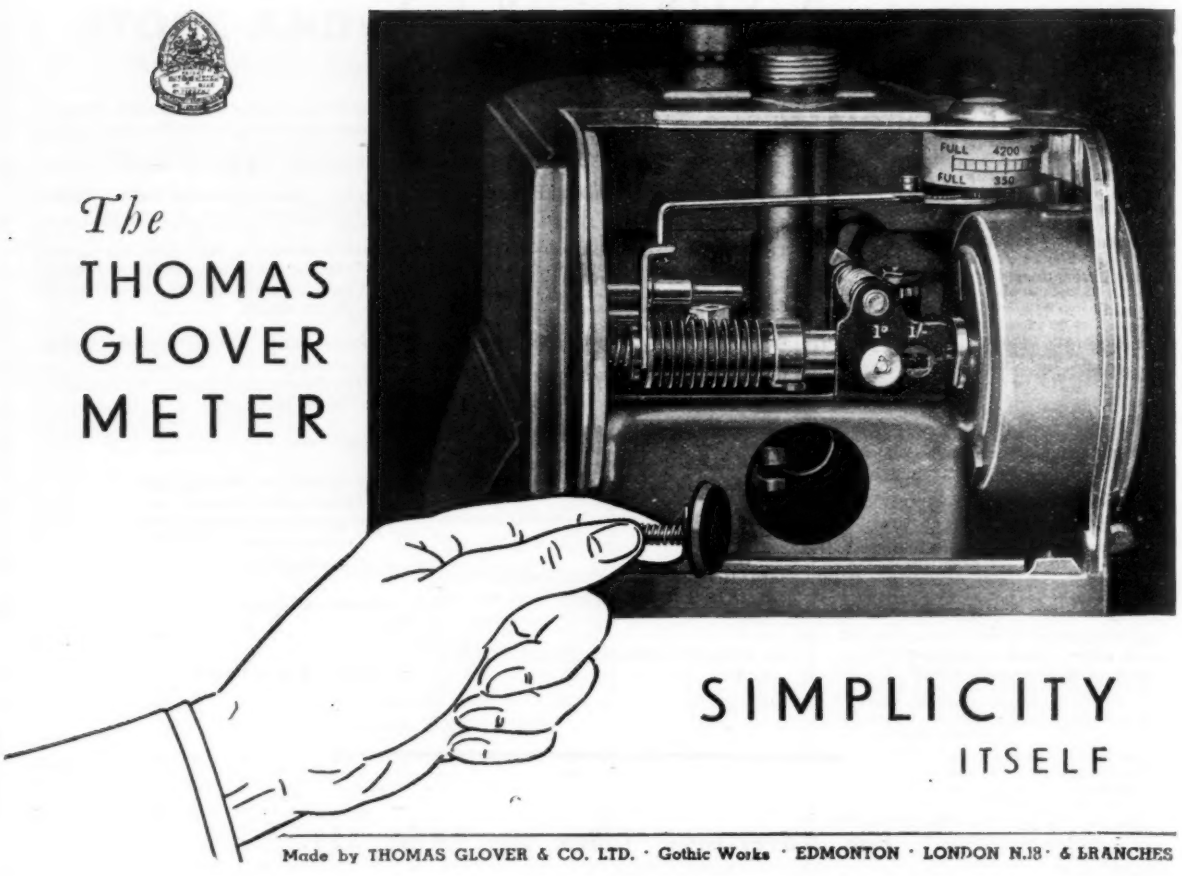

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